RAILROAD GAZETTE

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ALPHABETICAL INDEX TO ADVERTISEMENTS.

RAILROAD GAZETTE DIRECTORY: CLASSIFIED ADVERTISEMENTS.

Air Brake Fittings
Stanley G. Flagg & Co., Phila.
Air Brake Hose
N.Y. Belt. & Pack. Co.,15 Park Row, N.Y.
Air Brake Regulator
Mason Regulator Co., Boston.
Air Compressors & Rock Drills
Ingersoll-Sergeant Rock Drill Co., 10 Park Place, N. Y.
Rand Drill Co., 23 Park Place, N. Y.
Aluminum
Pittsburgh Reduction Co.
Architect
Bradford L. Gilbert, 50 Broadway, N. Y.
Thomas Appleton, 505 Rialto Bldg., Chic.
Asbestos Packing
H. W. Johns Mfg. Co., N. Y. City.
Asphalt Pavement
Welsh Pavement Co., 16 Exch. Pl., N. Y.
Axles
Cambria Iron Co., Johnstown, Pa.
Lima Machine Works, Lima O.
Louisville Steam Forge Co., Louisv., Ky.
Michigan Car Co., Detroit, Mich.
Mich. Forge & Iron Co., Detroit, Mich.
Midvale Steel Co., Nicetown, Phila.
Pittsb'gh Forge & Iron Co., Pittsb., Pa.
T. Prosser & Son, 15 Gold St., N. Y.
Balanced Slide-Valves
M. C. Hammett, Troy, N. Y.
Ballast Unloaders
Marion Steam Shovel Co., Marion, O.
Bankers
Brown Bros. & Co., 59 Wall street, N. Y.
Bell Cord & Couplings
Samson Cordage Works, Boston, Mass.
Blacks
Boston & Lockport Block Co., Boston, Mass.
Boilers
Abendroth & Root Mfg. Co., 28 Cliff St., N.Y.
Lidgerwood Mfg. Co., 96 Lib'ty St., N.Y.
Rich. Loco. & Mach. Co., Richmond, Va.
Boiler Plate
Schoenberger & Co., Pittsburgh, Pa.
Bolt Cutters
Acme Machinery Co., Cleveland O.
Howard Iron Works, Buffalo, N. Y.
Bolts & Nuts
American Supply Co., Kansas City, Mo.
Fuller Bros. & Co., 139 Gr'nwich St., N.Y.
Rhode Island Tool Co., Providence.
Books & Publications
E. & F. N. Spon & Co., 12 Cortl'dt St., N.Y.
John C. Trautwine, Jr.
Brake Adjusters
Q. & C. Co., Chicago.
Brake Beams
Nat. Hollow Brake Beam Co., Chic., Ill.
Northwestern Equipment Co., Chicago.
Schoen Mfg. Co., Pittsburgh.
Brakes
Beales Ry. Brake Co., 53 Broadway, N.Y.
Boyden Brake Co., Baltimore, Md.
Westinghouse Air-Brake Co., Pittsb., Pa.
Brake-Shoes
Congdon Brake-Shoe Co., Chicago, Ill.
Lappin Brake-Shoe Co., 45 Br'dway, N.Y.
Ramapo Wheel & Foundry Co., Ramapo, N. Y.
Bridges
Anderson & Barr, Jersey City, N. J.
Berlin Iron Bridge Co., E. Berlin, Conn.
Boston Bridge Works, Boston, Mass.
Chicago Bridge & Iron Co., Chicago, Ill.
Cofrode & Saylor, Philadelphia, Pa.
Detroit Bridge & Iron Wks, Det., Mich.
Edge Moor Bridge Wks, Wilmington, Del.
Elmira Bridge Co., Elmira, N. Y.
S. W. Frescoln, World Bldg., N. Y.
Hilton Bridge Const. Co., Albany, N. Y.
Keystone Bridge Co., Pittsburgh, Pa.
King Iron Bridge Mfg. Co., Cleveland, O.
Levering & Garrigues, Philadelphia.
Louisville Bridge & Iron Co., Louisv., Ky.
Mo. Val. Br. & Ir. Wks., Leavenw., Kan.
Mt. Vernon Bridge Co., Mt. Vernon, O.
New Jersey Steel & Iron Co., Trenton, N. J.
Passaic Rolling Mill, Paterson, N. J.
Phœnixville Bridge Co., Phila., Pa.
Pittsburgh Bridge Co., 1165 Owings Bldg., Chicago.
Pottsville Bridge Co., Phila.
Rochester Bridge & Ir. W'ks, Rochester.
A. & P. Robert's & Co., Philadelphia, Pa.
San Francisco Bridge Co., California.
Shaler & Schmiglau, Chicago, Ill.
Shiffler Bridge Co., Pittsburgh, Pa.
Sooysmith & Co., 2 Nassau street, N. Y.
Union Bridge Co., 18 Broadway, N. Y.
J. A. L. Waddell, Kansas City, Mo.
Wallis Iron Works, Jersey City, N. J.
Youngstown (Ohio) Bridge Co.
Bridge Machinery
Vulcan Iron Works, Chicago.
Bridge Timbers
Alexander McClure, Pittsburgh, Pa.
Buildings
Berlin Iron Bridge Co., E. Berlin, Conn.
Bulldozers
Williams, White & Co., Moline, Ill.
Cars
American Supply Co., Kansas City, Mo.
Bloomsburg Car Co., Bloomsburg, Pa.
Osgood Bradley & Sons, Worcester, Mass.
J. G. Brill & Co., Philadelphia, Pa.
Reginald Canning & Co., 115 B'way, N.Y.
Ensign Mfg. Co., Huntington, West Va.
Erie Car Works (Limited), Erie, Pa.
Jackson & Sharp Co., Wilmington, Del.
Jackson & Woodin Mfg. Co., Berwick, Pa.
A. S. Males & Co., Cincinnati.
Michigan Car Co., Detroit, Mich.
Middletown Car W'ks, Middletown, Pa.
N. Y. Equipment Co., 15 Wall St., N. Y.
R. M. Pancoast, Camden, N. J.
Pardee Car & Mach. Wks, Watsont'n, Pa.
South Baltimore Car Works, Baltimore.
St. Charles Car Co., St. Charles, Mo.
Wason Mfg. Co., Springfield, Mass.
Youngstown (Ohio) Car Mfg. Co.
Cars, Second Hand
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati.
N. Y. Equipment Co., 15 Wall St., N. Y.
Car Couplings
Auto. Interchangeable Car Coupler Co., San Francisco, Cal.
Drexel Car Coupler Co., Rookery, Chic.
Gould Coupler Co., Buffalo, N. Y.
Hinson Car Coupler Co., Chicago, Ill.
McConway & Torley Co., Pittsburgh, Pa.
St. Louis Car Coupler Co., St. Louis, Mo
Smillie Coupler & Mfg. Co., Newark, N.J.
Stilger & Strosler Aut. Car Coup. Co., Louisville, Ky.
The Standard Car Coup. Co., Troy, N.Y.
Trojan Car Coupler Co., Troy, N. Y.
Thurmond Car Coup. Co., 80 B'way, N.Y.
Union Coupler Co., Philadelphia.
Van Dorston Coup. Co., Phila., Pa.
Car Doors
Q. & C. Co., Chicago, Ill.
Car Furnishings
Adams & Westlake Co., Chicago.
Dayton Mfg. Co., Dayton, O.
Car Heaters
Baker Heater Co., 799 Gr'nwich St., N.Y.
Consol. Car Heating Co., Albany, N. Y.
Gold Car Heat. Co., Frankfort & Cliff St., N. Y.
Martin Anti-Fire Car-Heat. Co., Dunkirk, N. Y.
Morton Safety Heating Co.
National Car Heating Co., Chicago.
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light Co., 160 B'way, N. Y.
Car Heating Equipment
Stanley G. Flagg & Co., Philadelphia.
Car Lamps and Lanterns
Adams & Westlake Co., Chicago.
Car Machinery
Greenlee Bros. & Co., Chicago.
Car Plushes
Sanford Mills, 129 Wash'ton St., Boston.
Car Pushers
Stafford-Munson Co., Gr'nd Rap., Mich.
Boston & Lockport Block Co., Boston.
Car Replacers
Q. & C. Co., Chicago.
Car Seats
Adams & Westlake Co., Chicago.
Hartford Woven Wire Mattress Co., Hartford, Conn.
Hale & Kilburn Mfg. Co., Phila.
Car Seals
Buffalo Seal & Press Co., Buffalo, N. Y.
Car Roofs
C. B. Hutchin's Sons, Detroit.
Lee Composite Mfg. Co., New York.
Car Upholstering
Knitted Mattress Co., Canton Jct., Mass.
Car Wheel Presses
Tinius Olsen & Co., Philadelphia, Pa.
Car Wheels
Allen Paper Car-Wheel Co., Chicago, Ill.
American Steel Wheel Co., N. Y. City.
Baltimore Car-Wheel Co., Balto., Md.
Barnum & Richardson Mfg. Co., Chic.
J. H. Bass, Chicago, Ill.
Boles Steel Wheel Co., Scranton, Pa.
Bowler & Co., Cleveland.
Cayuta Wheel & Foundry Co., Sayre, Pa.
Cushion Car Wheel Co., Indianapolis.
Davenport & Fairbairn, Erie, Pa.
Detroit Car-Wheel Co., Detroit, Mich.
Dickson Car Wheel Co., Houston, Tex.
C. G. Eckstein & Co., 32 Liberty St., N.Y.
Jersey City Wheel Fd'y & Mach. Works, Jersey City, N. J.
Lima Machine Works, Lima, O.
Lobdell Car-Wheel Co., Wilmington, Del.
Louis. Car-Wheel Co., Louisville, Ky.
Michigan Car Co., Detroit, Mich.
N. Y. Car Wheel Works, Buffalo.
Page, Newell & Co., New York & Boston.
Thos. Prosser & Son, 15 Gold street, N.Y.
Ramapo Wheel & F'dry Co., Ramapo, N.Y.
St. Louis Car-Wheel Co., St., Louis, Mo.
Stand. Steel W'ks, 230 So. 4th St., Phila.
Taylor Iron & Steel Co., High Bridge, N.J.
Washburn Car-Wheel Co., Hartf'd, Conn
Wason Mfg. Co., Springfield, Mass.
A. Whitney & Sons, Philadelphia, Pa.
Car Window Balance
Caldwell Mfg Co., Rochester, N. Y.
O. K. Gardiner, Box 171, Pittsburgh, Pa.
Cattle Guards
Kalamazoo R. R. Veloc. & Car Co., Kalamazoo, Mich.
National Surface Guard Co., Chicago.
Coal Transferring
C. W. Hunt Co., 45 Broadway, New York.
Consulting Engineers
Thomas Appleton, 505 Rialto Bldg., Chic.
G. Bouscaren, Cincinnati, O.
D. L. Barnes, The Rookery, Chicago.
J. J. R. Croes, 13 William St., N. Y.
S. W. Frescoln, World Bldg., N. Y.
W. C. Foster, 52 Broadway, N. Y.
Geo. L. Fowler, 53 Broadway, N. Y.
Albert Laclau, 71 Broadway, N. Y.
W. B. Parsons, 35 Broadway, N. Y.
Chas. Paine & Sons, 71 Broadway, N. Y.
F. H. Smith, 227 E. German St., Balto., Md.
Von Schon & Garrer, Fredericksb., Va.
J. A. L. Waddell, Kansas City, Mo.
Wilson Bros. & Co., Philadelphia, Pa.
Consulting Electrical Engineers
Sprague, Duncan & Hutchinson, N. Y.
Copper
Hendricks Bros., 49 Cliff street, N. Y.
Cordage
Samson Cordage Works, Boston, Mass.
Corrugated Iron
Cincinnati Corrugating Co., Piqua, O.
Cranes
Industrial Works, Bay City, Mich.
John N. Poage, Cincinnati, O.
R. D. Wood & Co., Philadelphia, Pa.
Yale & Towne Mfg. Co., Stamford, Conn.
Creosoting
Lehigh Valley Creosoting W'ks., P. Amboy, N. J.
Creosote Lumber & Construction Co., Fernandina, Fla.
Crossings
American Supply Co., Kansas City, Mo.
Fontaine Crossing Co., Detroit, Mich.
Crossing Gates
Bogue & Mills Mfg. Co., Chicago.
Culvert Pipe
Blackmer & Post, St. Louis, Mo.
Cupolas
Byram & Co., Detroit, Mich.
Door Springs
Norton Door Check & Spring Co., Boston.
Draft Rigging
Schoen Mfg. Co., Pittsburgh, Pa.
Drawbar Attachment
Amer. Continuous Draw Bar Co., Aurora, Ind.
American Steel Wheel Co., N. Y. City.
Butler Drawbar Attachment Co., Cleveland.
Dredging Machinery
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
San Francisco Bridge Co., California.
Vulcan Iron Works, Chicago.
Vulcan Iron Works, Co., Toledo.
Drop Forgings
Billings & Spencer Co., Hartford, Conn.
Electric Crossing Signal
Electric Supply & Mfg. Co., Cleveland, O.
Electric Headlights
Nat. Elect. Headlight Co., Indianapolis.
Electric Motors
Thomson-Houston Motor Co., Boston.
Electric Railways
Thomson-Houston Electric Co., Boston.
Emery Wheels
New York Belting & Packing Co., 15 Park Row, N. Y.
Northampton Emery W. Co., Leeds, Mass.
H. A. Rogers, 19 John street, N. Y.
Springfield Emery Wh. Mfg. Co., Bridgeport, Conn.
Tanite Co., Stroudsburg, Pa.
Employment
Engineering Instruments
Chas. E. Brightly, Philadelphia Pa.
Heller & Brightly, Philadelphia, Pa.
C. F. Ketcham & Co., 27 Nassau St., N. Y.
Keuffel & Esser, New York City.
Queen & Co., Philadelphia, Pa.
Young & Sons, Philadelphia, Pa.
Engines
Fishkill Landing Machine Co., Fishkill, N. Y.
Lane & Bodley Co., Cincinnati, O.
Philadelphia Engineering Wks., Phila.
Excavators
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Industrial Works, Bay City, Mich.
A. S. Males & Co., Cincinnati, O.
Marion Steam Shovel Co., Marion, O.
Osgood Dredge Company, Albany, N. Y.
J. Souther & Co., Boston, Mass.
Vulcan Iron Works, Chicago.
Vulcan Iron Works Co., Toledo.
Explosives
Rendrock Powder Co., 26 Park Place, N. Y.
Feed-Water Purifier
Field Water Purifier Co., Chicago.
Flexible Shafting
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
Freight Cars, Second Hand
New York Equip. Co., 15 Wall St., N. Y.
Freight Conveyors
Industrial Works, Bay City, Mich.
Forges
Buffalo Forge Co., Buffalo, N. Y.
The Foos Mfg. Co., Springfield, O.
Frogs and Crossings
Allentown Rolling Mill, Allentown, Pa.
American Supply Co., Kansas City, Mo.
Cleveland Frog & Crossing Co., Cleveland, O.
Elliott Frog & Switch Co., E. St. Louis, Ill.
Johnston R. R. Frog & Switch Co., Phila.
Pennsylvania Steel Co., Steelton, Pa.
Ramapo Iron Works, Hillburn, N. Y.
Union Switch & Signal Co., Pittsburgh, Pa.
Weir Frog Co., Cincinnati, O.
Friction Buffers
Union S. & S. Co., Swissvale, Pa.
Furnaces
Abendroth & Root Mfg. Co., 28 Cliff St., N.Y.
Byram & Co., Detroit Mich.
Gauges (Pressure)
Ashcroft Mfg. Co., 111 Liberty St., N. Y.
Grader, Ditcher & Railroad Builder
F. C. Austin Mfg. Co., Chicago, Ill.
Guarantee Co.
Guarantee Co. of N. A., Montreal.
Hand Cars
The Buda Fdy & Mfg. Co., Harvey, Ill.
Fairbanks, Morse & Co., Chicago.
Kalamazoo R. R. Veloc. Co., Kalamazoo, Mich.
Sheffield Velocipede Car Co., Three Rivers, Mich.
Harbor Works
S. W. Frescoln, World Bldg., N. Y.
Headlights
Adams & Westlake Co., Chicago.
Nat. Elect. Headlight Co., Indianapolis.
Highway Crossing Signal
Electric Supply & Mfg. Co., Cleveland, O.
Hoisting Engines
Copeland & Bacon, New York City.
Industrial Works, Bay City, Mich.
Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
J. S. Mundy, Newark, N. J.
Vulcan Iron Works, Chicago.
Hollow Stay Bolt Iron
Falls Hollow Stay Bolt Co., Cuyahoga Falls, O.
Hydraulic Jacks
Richard Dudgeon, 24 Columbia St., N. Y.
Joseph F. McCoy Co., 26 Warren St., N.Y.
Watson & Stillman, 210 E. 43d St., N. Y.
Hydraulic Machinery
Tinius Olsen & Co., Philadelphia, Pa.
Union Iron Works, San Francisco.
Watson & Stillman, N. Y. City.
R. D. Wood & Co., Philadelphia, Pa.
Inspectors of Bridges and Ry Equipment
R. W. Hildreth & Co., 2 Wall St., N. Y.
Insurance
Hart. Steam Boiler Insp. & Ins. Co., Hartford.
Royal Ins. Co., 30 Wall street, N. Y.
Interlocking Switches & Signals
Allentown Rolling Mills, Allentown, Pa.
Hall Signal Co., 30 B'way, N. Y.
Kelsey Railroad Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
Union Switch & Signal Co., Pittsburgh, Pa.
Wharton R. R. Switch Co., Phila.
Iron—Taylor Yorkshire
B. M. Jones & Co., Boston, Mass.
Iron Work for Contractors
Edge Moor Bridge Works, Wilmington, Del.
Iron & Steel Ship Builders
Union Iron Works, San Francisco.
Injectors
Nathan Mfg. Co., 94 Liberty street, N. Y.
Wm. Sellers & Co., Phila. & 79 Liberty street, N. Y.
Jacks
Fairbanks, Morse & Co., Chicago.
McSherry Mfg. Co., Dayton, O.
Richard Dudgeon, 24 Columbia St., N. Y.
Watson & Stillman, 210 E. 43d St., N. Y.
Journal Bearings
Ajax Metal Co., Philadelphia, Pa.
Damascus Bronze Co., Pittsburgh, Pa.
Deoxidized Metal Co., Bridgeport, Conn.
Phosphor-Bronze Smelting Co., Philada.
Paul S. Reeves, Philadelphia, Pa.
Journal-Box Lids
Ramapo Wheel & F'dry Co., Ramapo, N. Y.
Lighting
Railroad Lighting & Mfg. Co., Phila., Pa.
Safety Car Heat. & Light Co., 160 B'way, N. Y.
Lock Washers
Nat. Lock Washer Co., Newark, N. J.
Locomotives
American Supply Co., Kansas City, Mo.
Baldwin Locomotive Works, Philada.
Brooks Locomotive W'ks, Dunkirk, N. Y.
Cooke Loco. & Mach. Co., Paterson, N. J.
Dickson Mfg. Co., Scranton, Pa.
G. L. Fowler, 53 Broadway, N. Y.
Lima Machine Works, Lima, O.

RAILROAD GAZETTE DIRECTORY: CLASSIFIED ADVERTISEMENTS

Locomotives (Continued)
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
New York Loco. Works, Rome, N. Y.
Pittsburgh Loco. & Car W'ks, Pittsburgh.
H. K. Porter & Co., Pittsburgh, Pa.
Richmond Loco. & Mach. Works, Richmond, Va.
Rogers Loco. & Machine Works, Paterson, N. J.
Schenectady Loco. Wks., Schenectady, N. Y.
Taite & Carlton, London, Eng.
Wharton R. R. Switch Co., Phila.

Locomotive Headlights
Nat Elect. Headlight Co., Indianapolis.

Locomotives, Second-Hand
Reginald Canning & Co., 115 B'way, N.Y.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.

Locomotive Staybolt Iron
Falls Hollow Staybolt Co., Cayughos Falls, O.

Lubricators
American Supply Co., Kansas City, Mo.
Nathan Mfg. Co., 92 Liberty street, N. Y.

Machinists' Tools
Acme Machy. Co., Cleveland, O.
Bement, Miles & Co., Philadelphia, Pa.
Billings & Spencer Co., Hartford, Conn.
E. W. Bliss Co., Brooklyn, N. Y.
Brown & Sharpe Mfg. Co., Providence, R. I.
Ferracute Machine Co., Bridgeton, N. J.
Gould & Eberhardt, Newark, N. J.
Edw. Harrington, Son & Co., Phila.
Hayes Tool Co., Portland, Me.
Long & Allstatter Co., Hamilton, O.
Manning, Max. & Moore, 111 Liberty St., N. Y.
Morse Tw. Dr. & Mach. Co., N. Bed'd, Mass.
Newark Mach. Tool Wks., Newark, N. J.
Niles Tools Works, Hamilton, O.
Pedrick & Ayer, Philadelphia, Pa.
Geo. Place, 120 Broadway, N. Y.
H. A. Rogers, 19 John St., N. Y.
D. Saunders' Sons, Yonkers, N. Y.
Wm. Sellers & Co., Phila. & 79 Liberty St., N. Y.
Stiles & Parker Press Co., Middletown, Conn.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.
Universal Radial Drill Co., Cincinnati.
Watson & Stillman, 240 E. 43d St., N. Y.
Westinghouse Machine Co., Pittsburgh, Pa.
Wharton R. R. Switch Co., Phila.

Malleable Iron Castings.
National Malleable Castings Co., Cleveland.

Mandrel Rolled Staybolt Iron
Falls Hollow Staybolt Co., Cayughos Falls, O.

Mining Machinery
Lidgerwood Mfg. Co., 96 Liberty St., N.Y.
Union Iron Works, San Francisco.

Mop Wringer
Boston Wringer Co., Boston.

Nut Locks
American Supply Co., Kansas City, Mo.
Amer. Washer & Mfg. Co., Newark, N. J.
Metcalf, Paul & Co., Pittsburgh, Pa.
National Lock Washer Co., Newark.
Ruffner & Dunn, Philadelphia, Pa.
Standard Nut Lock Co., N. Y.

Oil
Galena Oil Works, Ltd, Franklin, Pa.
Signal Oil Works, Ltd., Franklin, Pa.

Oil Cans
Bryant & Barbey, 79 Milk St., Boston.
H. A. Williams Mfg. Co., Boston.

Packing, Asbestos
H. W. Johns Mfg. Co., N. Y. City.

Packing-Rubber
N. Y. Belting & Pack. Co., N. Y. City.

Paint
Andrews Paint & Color Co., 13 Cortlandt street, N. Y.
F. W. Devoe & Co., Fulton & William Sts., N. Y.
Jos. Dixon Crucible Co., Jersey City, N.J.
Warren Chemical & Mfg. Co., N. Y. City.

Patents
Howson & Howson, 119 So. 4th St., Phila.
Geo. P. Whittlesey, Washington, D. C.

Phosphor-Bronze
Paul S. Reeves, Philadelphia.
Phosphor-Bronze Smelting Co., Phila.

Piling
American Supply Co., Kansas City, Mo.

Pile Drivers
Bucyrus Steam Shovel & Dredge Co., Bucyrus, O.
Industrial Works, Bay City, Mich.
Lidgerwood Mfg. Co., 96 Liberty St., N. Y.
Vulcan Iron Works, Chicago, Ill.

Pipe Cutting and Threading Machines
D. Saunders' Sons, Yonkers, N. Y.

Pneumat c Foundations
S. W. Frescoln, World Bldg., N. Y.

Portable Drills
Frank Reed, Worcester, Mass.
Stow Flexible Shaft Co., Phila., Pa.
Stow Mfg. Co., Binghamton, N. Y.

Pressed Steel
Schoen Mfg. Co., Pittsburgh, Pa.

Pulley Blocks
Boston & Lockport Block Co., Boston, Mass.

Pumps
Fairbanks, Morse & Co., Chicago.
Laidlaw & Dunn Co., Cincinnati, O.
Valley Pump Co., Easthampton, Mass.
R. D. Wood & Co., Philadelphia, Pa.
H. R. Worthington, 96 Liberty St., N. Y.

Radial Taps
J. T. Connelly, Milton, Pa.

Rails
American Supply Co., Kansas City, Mo.
Bethlehem Iron Co., 80 Broadway, N. Y
Cambria Iron Co., Johnstown, Pa.
O. W. Child & Co., 115 Broadway, N. Y.
Geo. A. Evans, 40 and 42 Wall St., N. Y.
Humphreys & Sayce, 10 Wall St., N. Y.
Illinois Steel Co., Chicago, Ill.
A. S. Males & Co., Cincinnati.
N. Y. Equipment Co., 15 Wall St., N. Y.
Pennsylvania Steel Co., 2 Wall St., N. Y.
Robinson & Orr, Pittsburgh, Pa.
A. S. Whiton, 115 Broadway, N. Y.

Rail Fastenings
American Supply Co., Kansas City, Mo.
Cambria Iron Co., Johnstown, Pa.
Fisher Rail-Joint Works, Trenton, N. J.
A. S. Males & Co., Cincinnati.
Metcalf, Paul & Co., Pittsburgh, Pa.
National Lock Washer Co., Newark, N.J.
N. Y. Equipment Co., 15 Wall St., N. Y.
Morris Sellers & Co., Chicago.
Ruffner & Dunn, Philadelphia, Pa.

Rail Saws
Bryant & Barbey, 79 Milk St., Boston.
Industrial Works Bay City, Mich

Railroad Printing
W. H. Campbell, 19 Union Sq., N. Y. Cy.
C. F. Ketcham & Co., 27 Nassau St., N. Y.

Railroad and Transp. Lines
Big Four.
Boston & Albany.
Chicago & Alton.
Chicago, Burlington & Quincy.
Chicago, Milwaukee & St. Paul.
Chicago & Northwestern.
Chicago, Rock Island & Pacific.
C., H. & D.
Hoosac Tunnel Route.
Illinois Central.
Lehigh Valley R. R.
Michigan Central.
Missouri Pacific.
New York Central & Hudson River.
New York, Lake Erie & Western.
New York & New England R. R.
Pennsylvania.
Stonington Line.

Railroad Supplies
American Supply Co., Kansas City, Mo.
Bryant & Barbey, 79 Milk St., Boston.
Reginald Canning & Co., 115 B'way, N.Y.
O. W. Child & Co., 115 Broadway, N. Y.
Fairbanks, Morse & Co., Chicago.
E. S. Greeley & Co., 7 Dey St., N. Y.
Intern. Ry. Equipm. & Supply Co., N. Y.
The Johnson R. R. Signal Co., Rahway.
A. S. Males & Co., Cincinnati, O.
N. Y. Equipment Co., 15 Wall St., N. Y.
N. Y. Railway Supply Co., 40 Wall St., N. Y.
G. D. Peters & Co., London, England.
H. A. Rogers, 19 John St., N. Y.
A. T. Shoemaker, Chicago and N. Y.

Railway Equipment
American Supply Co., Kansas City, Mo.

Ratchet Drills
Billings & Spencer Co., Hartford, Conn.
Schuttler Mfg. Co., Chicago.

Reducing Valves
Curtis Regul. Co., 99 Beverly St., Boston.
Mason Regulator Co., Boston, Mass.

Refined Iron
Falls Hollow Staybolt Co.

Refrigerator Cars
R. M. Pancoast, Camden, N. J.
So. & Pac. Refrigerator Car Co., Chicago.

Refrigerating Machinery
The De La Vergne Refrig. Machine Co., N. Y.

Rock Ballast and Rock Breakers
Gates Iron Works, Chicago, Ill.

Rock Drills
Ingersoll-Sergeant Rock Drill Co., N. Y.
Rand Drill Co., 23 Park Place, New York.

Roofs
Berlin Iron Bridge Co., E. Berlin, Conn.
Cincinnati Corrugating Co., Piqua, O.

Rolling Stock to Lease
Oliver Adams, 32 Liberty St., N. Y.

Rubber Belting
N. Y. Belting & Pack. Co., 15 Park Row, N. Y.

Safety Valves
Ashton Valve Co., Boston, Mass.

Saw Mills
Richmond Loco. & Mach. Wks., Richmond, Va.

Second-Hand Rolling Stock
American Supply Co., Kansas City, Mo.
A. S. Males & Co., Cincinnati.

Sewer Pipe
Blackmer & Post, St. Louis, Mo.
R. D. Wood & Co., Philadelphia, Pa.

Sewerage
J. J. R. Croes, 13 William St., N. Y.
Nat. Switch & Signal Co., So. Bethlehem, Pa.

Union Switch & Signal Co., Pittsburgh, Pa.

Shafting
Wm. Sellers & Co., Phila.

Signals.
Hall Signal Co., 30 Broadway, N. Y.
Johnson Railroad Signal Co., Rahway, N. J.
Kelsey Railroad Signal Co., Florence, Mass.

Skylights
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Falls Hollow Staybolt Co., Cuyahoga Falls, O.

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American Supply Co., Kansas City, Mo.
Dilworth, Porter & Co., Pittsburgh, Pa.
Q & C Co., Chicago.
Morris Sellers & Co., Chicago.

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Atkinson Steel & Spring Works, Chicago, Ill.
Farist Steel Co., Bridgeport, Conn.
A. French Spring Co., Pittsburgh, Pa.
Chas. Scott Spring Co., Philadelphia, Pa.

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John N. Poage, Cincinnati, O.
Sheffield Veloc. Car Co., Three Rivers, Mich.

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Falls Hollow Staybolt Co., Cuyahoga Falls, O.
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B. M. Jones & Co., Boston & N. Y.

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Moran Flex. Steam Joint Co., Louisville, Ky.

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Cambria Iron Co., Johnstown, Pa.

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Pratt & Letchworth, Buffalo, N. Y.

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Lukens Iron & Steel Co., Coatesville, Pa.

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Midvale Steel Co., Nicetown, Phila.
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Kelsey Railroad Signal Co., Florence, Mass.
Nat. Switch & Signal Co., So. Bethlehem, Pa.
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Ramapo Iron Works, Ramapo, N. Y.
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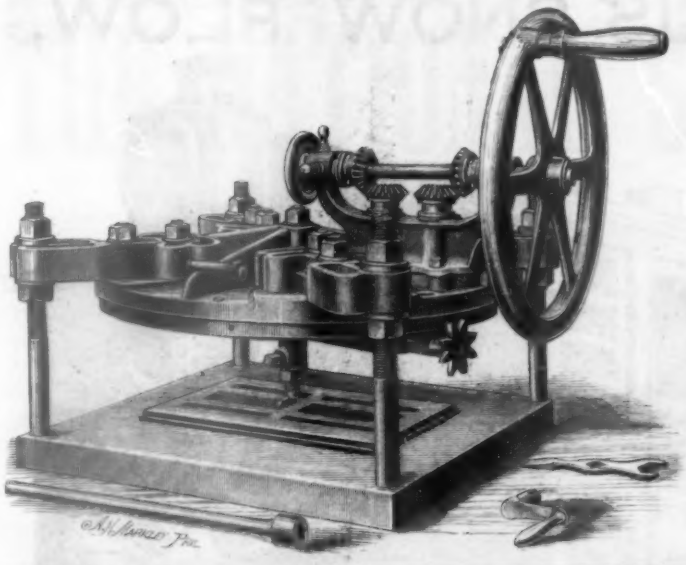

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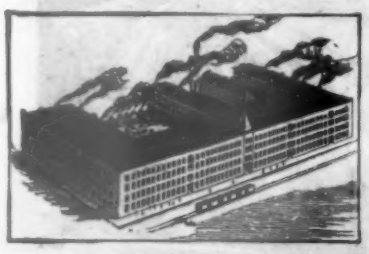

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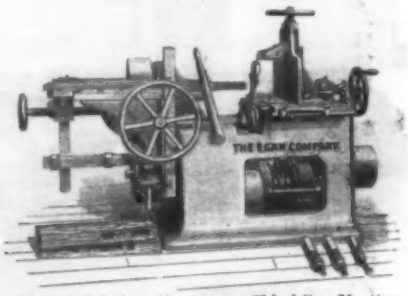

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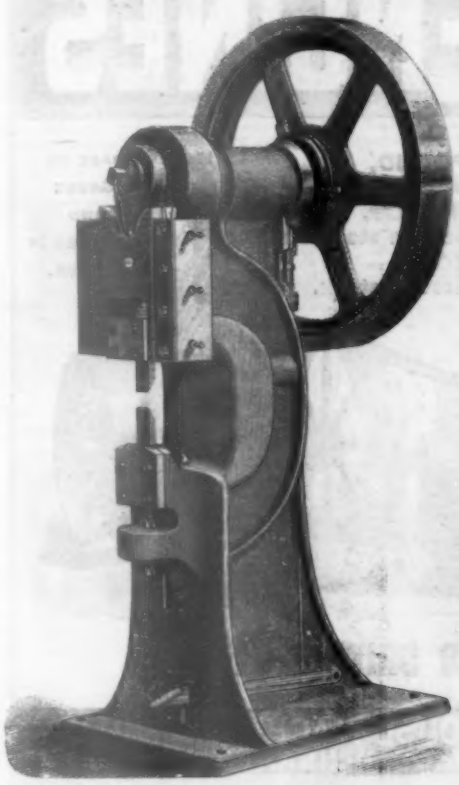

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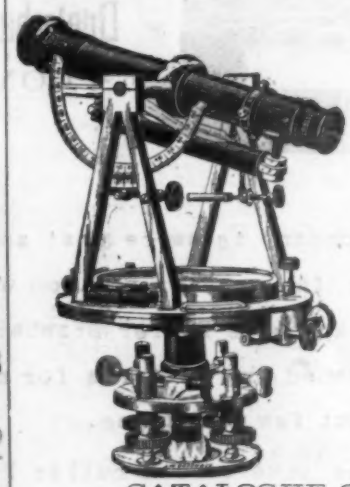

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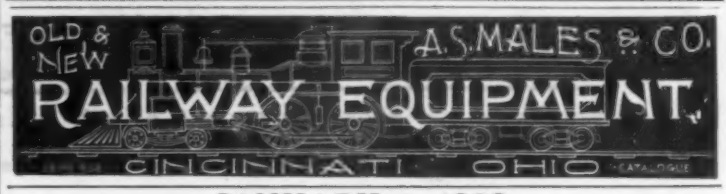

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Date.			Drawheads.	Knuckles.
September,	1890,	- -	5	49
October,	"	-	8	81
November,	"	- -	45	147
December,	"	- -	50	131
January,	1891,	- -	22	116
February,	"	- -	66	122
March,	"	- -	63	172
April,	"	- -	51	176
May,	"	- -	13	100
June,	"	-	28	110
July,	"	- -	13	72
August,	"	- -	19	104
September,	"	- -	21	73
October,	"	- -	18	112
Total,	-	-	422	1,565

PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads, - - - - **3 39/100**
Knuckles, - - - - **12 54/100**

LIFE.

Drawheads, - - - **30** years.
Knuckles, - - - **8** "

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Will contract with any railroad company to equip 1,000 or more cars at low prices, and will agree to maintain them for

$650 PER THOUSAND CARS.

Compare the Following:

10,000 Couplers.

Date.			Drawheads.	Knuckles.
September,	1890	- -	174	138
October,	"	- -	147	311
November,	"	- -	274	492
December,	"	- -	283	508
January,	1891	- -	252	382
February,	"	- -	271	484
March,	"	- -	249	638
April,	"	- -	225	522
May,	"	- -	216	560
June,	"	-	227	511
July,	"	- -	231	454
August,	"	- -	232	455
Total,	-	-	2,781	5,455

PERCENTAGE OF BREAKAGES FOR ONE YEAR.

Drawheads, - - - - **27 81/100**
Knuckles, - - - - **54 55/100**

LIFE.

Drawheads, - - **3** yrs. **6** mos.
Knuckles, - - **1** " **9** "

Should **seventy-five per cent.** of above breakages be replaced **without charge,** and twenty-five per cent at, say **$9.20** each for drawheads, and **$2.80** for knuckles, the cost of maintenance would be about **$2.04** per car per annum, and would cost, **exclusive of locks, etc.**

$2,040 PER THOUSAND CARS.

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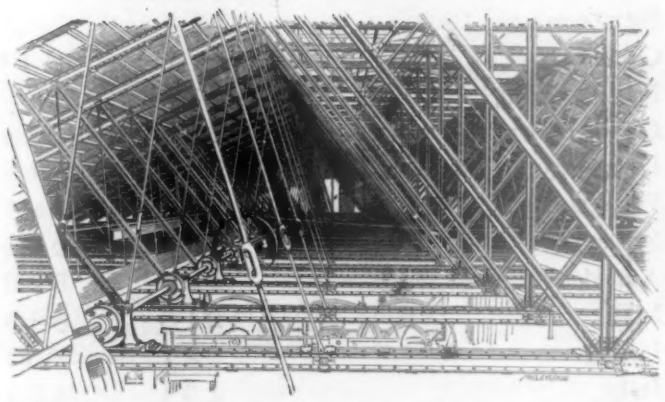

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☞ Please Note Announcement on Next Page.

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RAILROAD GAZETTE

FRIDAY, JAN. 15.

CONTENTS.

Contributions.

Coupled Engines or Single?

TO THE EDITOR OF THE RAILROAD GAZETTE:

The fallacy that much of the power of a locomotive is lost by the use of parallel rods has long been advanced in criticisms of the American type of locomotive for high speeds, and often reappears. The fact is, there is very little lost power by the use of a parallel rod, and it is one of the most efficient connections that has ever been used or proposed between two revolving bodies. It is vastly more efficient than a gear, belt or frictional contact. If so much power as is claimed is lost by the use of a parallel rod, it must appear somewhere as heat, and yet those who are familiar with the action of high speed engines know that when the rods and bearings are in good condition the crank pins are always quite cool at the end of a long run. If there was much power lost there would be much heating.

One English writer recently stated his belief that the time is coming when Americans will use single driver engines for high speed. What sort of a train could be run at high speed and make time between New York and Chicago with locomotives having a single pair of drivers? There could be neither a smoker, dining car, baggage nor postal cars. Probably the sleepers would have to be discarded, and in their place would only be the ordinary and lightest form of coaches if a sufficient number of passengers were to be carried to make the trains pay. It is sufficient to say that we shall never discard the parallel rod until the public is satisfied to ride with ordinary English comfort in light cars and sleep sitting up in a compartment car. One can imagine the disagreeableness of a 900-mile journey in such a train. To say, as the writer in question did, that a single pair of drivers has been found sufficient to haul English fast trains, is an acknowledgement of the extremely light weight of such trains. CHICAGO.

TO THE EDITOR OF THE RAILROAD GAZETTE:

With reference to the above I do not think there is evidence to support it. I believe that the World's Fair Express can be pulled with a single driver engine, and that many trains on the New York Division of the P. R. R. can be pulled with such an engine. I think that fast trains must be light, and that a single driver engine is enough for them. What we lack is cylinder power, not adhesive weight for such trains. Of course, the usual trains require the coupled engine. Do not misunderstand me. I say that light, fast trains, which are going to increase as the population increases, can be pulled by the single engine with the sand blast to assist in places.

I have no idea that the friction of side rods is much. Of course it is something, and ought to be got rid of if practicable. At high speeds the internal resistance of locomotives and tenders is 50 per cent., or more, of the total resistance, and this is overlooked by most people, or rather it is not known to them. Side rods must make part of it, and possibly a good deal of it; of course I do not know. BOSTON.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Chicago" makes a good point in showing that power if lost in the side rods should appear as heat, which would indicate wear. One fine example that it does not was the case of a locomotive on the Erie, with non-adjustable side rods, running 80,000 miles (about 15 months) without repairs at the wrist pins.

The value of English prophecy as to American practice may be shown by the following: One of the most prominent of English locomotive builders said at Baldwin's shop, Philadelphia, in 1870, and used arguments that proved it to his satisfaction, that Americans, in a very few years, would return to the crank axle and inside cylinders. His prophecy will be 22 years old next July.

As to hauling heavy trains with one driving axle, "Chicago" omits a serious factor, that is the size of the wheels. The English use very large wheels. The smaller wheels of American engines give a uniformity of speed and a facility of starting that was so fully appreciated by the tortoise in estimating his powers against the long legs of the hare. NEW YORK.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The argument of "Chicago" refers to the side rod in the abstract rather than as applied to high speed locomotives, for he attempts to refute the argument of English engineers against the use of the side rod for high speed locomotives, with the argument for the parallel rod as a general type of connection. I do not doubt but these same English engineers would agree most heartily with him that the parallel rod is a most efficient connection in many instances.

He makes the statement that "If so much power, as is claimed, is lost, it must appear somewhere as heat, etc." This is poor logic, for while effective power in pulling the train may be lost, the power may be expended in other ways, and it certainly does not follow that even if this power was all dissipated in heat that it would appear at the crank pins. I certainly agree with the Englishmen that there is a loss of effective pulling power when parallel rods are used at high speeds; for the wheels have to be balanced for the weight of the side rods and there is an increased weight of load and rotating parts due to counterbalances and rods; work necessary to keep the pins always in line; and increased friction on curves.

Certainly if our American engine had sufficient weight on the main drivers to enable it to start the train without slipping, without the parallel rods, our engines could be run at a higher rate of speed than at present; but I think this would unquestionably call for very light trains, as we could not in practice get a single bearing which would sustain sufficient weight to run cool with our present trains.

Where *light* trains are run *very fast* with *long distances* between stops, the single driver engine is, in my opinion, the better, but with our American practice of very heavy through trains, with anywhere from eight to fifteen cars, including four or five Pullman cars, or the lighter local trains, stopping and starting frequently, it would be entirely impracticable. ERIE.

Proportions of Cylinders for Compound Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Oct. 2 you published some comments on the above subject, with a table of comparative cylinder volumes which must be of value to all who are interested in compound locomotives. The comparative figure which you used, viz.: that obtained by dividing the volume of the low pressure cylinder or cylinders in inches by the product of one-half the circumference of the drivers in feet and the tons weight on drivers, shows such a wide variation in proportions that conservative managers might well find in it an apparent argument for further delay in introducing this form of locomotive, "while the adventuresome fellows are doing the experimenting."

There is, of course, and always will be, in any question of machine design, a personal equation of considerable weight, or in other words, the differences due to the individuality of the designer which can hardly be said to be matters of opinion, judgment, or even prejudice. The results are dimensions here and there which the designer cannot demonstrate to be just right, and which no one else can prove conclusively to be wrong. This applies especially of course to the many small parts in a steam engine for which there is no method of exactly calculating the proportions, and it also applies to a certain extent where calculation is possible. For example, refer to the accompanying table, in which a factor similar to that which you have published is calculated for 10 recent simple locomotives for which the boiler pressures are presumably not far different. The average value of the comparative volume factor is 17.5. The smallest value is 18.9 per cent. below this and the largest is 20.5 per cent. above, or the total variation is 39.4 per cent. of the mean. Taking the American compounds in your table and omitting the Johnstone engines, as they are evidently of exceptional proportions, the smallest value is 25 per cent. below the mean and the largest 13.5 per cent. above it, or the total variation is 38.5 per cent. of the mean value. These figures are for five makes of compound and seven makes of simple locomotives, and we see that in these cases there is a trifle more variation among the simple engines than among the compounds. It is evident that all of these proportions cannot be equally good, but if, after the many years of experience which our locomotive designers have had, such wide variation in the cylinder proportions of simple locomotives as these figures indicate is still admissible we cannot hope for much greater agreement among compound locomotives.

Comparative figures such as these may throw some light on the wide differences in the relative economy of compound locomotives in different comparative tests. It may be said, in general, that the greater the expansion the greater the economy of steam. Therefore, the engine which does its work with the earliest *average* cut-off should be the most economical, and therefore we would expect engines which have a large "comparative volume" to be the most economical, other things being equal. Thus, when a compound and a simple locomotive of the same general dimensions and by the same builder are subjected to a comparative test, and the "comparative volume" for the simple engine is large and that for the compound is below the average, it is not suprising that the difference in performance in favor of the compound is less than usual.

The question of the volume of cylinders and ratio of cylinder volumes for compound locomotives has recently received considerable attention, but there are a few factors which seem to have been overlooked in the discussion. In the first place, it is not rational to suppose that any rigid rule can be formulated which will fit all cases and types of locomotives. The elementary rules for determining the volumes either to avoid drop or to equalize work can at best serve only as a first approximation and for some types of compound locomotives are of practically no value. The greatest total expansion is, of course, fixed by the initial pressure and by the final pressure, which must be above the atmospheric pressure. This greatest expansion corresponds to the lightest work of the engine and thus one limit to the size of cylinders is established. But volumes established on this basis may be too small for the necessary work at late cut-offs, necessitating larger cylinders and throttling at comparatively late cut-offs for light loads instead of getting the full benefit of expansion.

COMPARATIVE CYLINDER CAPACITIES OF SIMPLE LOCOMOTIVES.

By whom built or operated.	Type.	Diam. of cylinders.	Length of stroke.	Diam. of drivers.	Weight on drivers.	Comparative volume.
				Ins.	Tons.	
N. Y., L. E. & W.—Baldwin, Rhode Island Lo. Works	10 wheel.	20	24	68	50.0	16.9
	Consolidation.	20	24	50	54.75	21.1
M., L. S. & W.—Rhode Island	Mogul.	18	24	56	45.3	18.4
Brooks Locom. Works	10 wheel	18½	24	68	51.0	14.2
Brooks' Locom. Works	"	18	24	63	44.4	16.7
C., M. St. Paul—Rhode Island	"	19	24	64	47.5	19.1
Wabash	"	18	24	69	49.6	16.9
Maine Central	Mogul.	19	20	62½	47.5	18.1
Canadian Pacific.	10 wheel.	20	22	75	42.0	16.8
N. Y. C. & H. R.	8 wheel.	19	24	78	40.0	16.7

Then come questions of starting power, division of work and the practical limits of the valve gear, and the final result is that there is a large factor to be supplied by the experience and "mechanical intuition" of the designer. We may make the general statement that the engine which does its work with the greatest average total expansion uses the smallest weight of steam per horse power, other things being equal; but it does not follow because A uses a cylinder ratio of 3 on certain engines and 2.5 on certain others that he is guessing at his proportions, nor that B's ratio of 2.25 for another type of engine is wrong. When the saving by compound locomotives is reduced back to the coal pile and therefore includes engine and boiler, and such items as different forms of valves, size of nozzles, frequency of exhaust, receivers or no receivers, and very likely different proportions of boiler, it is simply impossible to give each of these variables its proper weight, and the best dimensions for each type can be definitely established only by extended tests in service. The best type of compound locomotive may possibly be demonstrated by such tests, but it is probable that, as Mr. Mallet has said, this will always be to great extent a matter of preference.

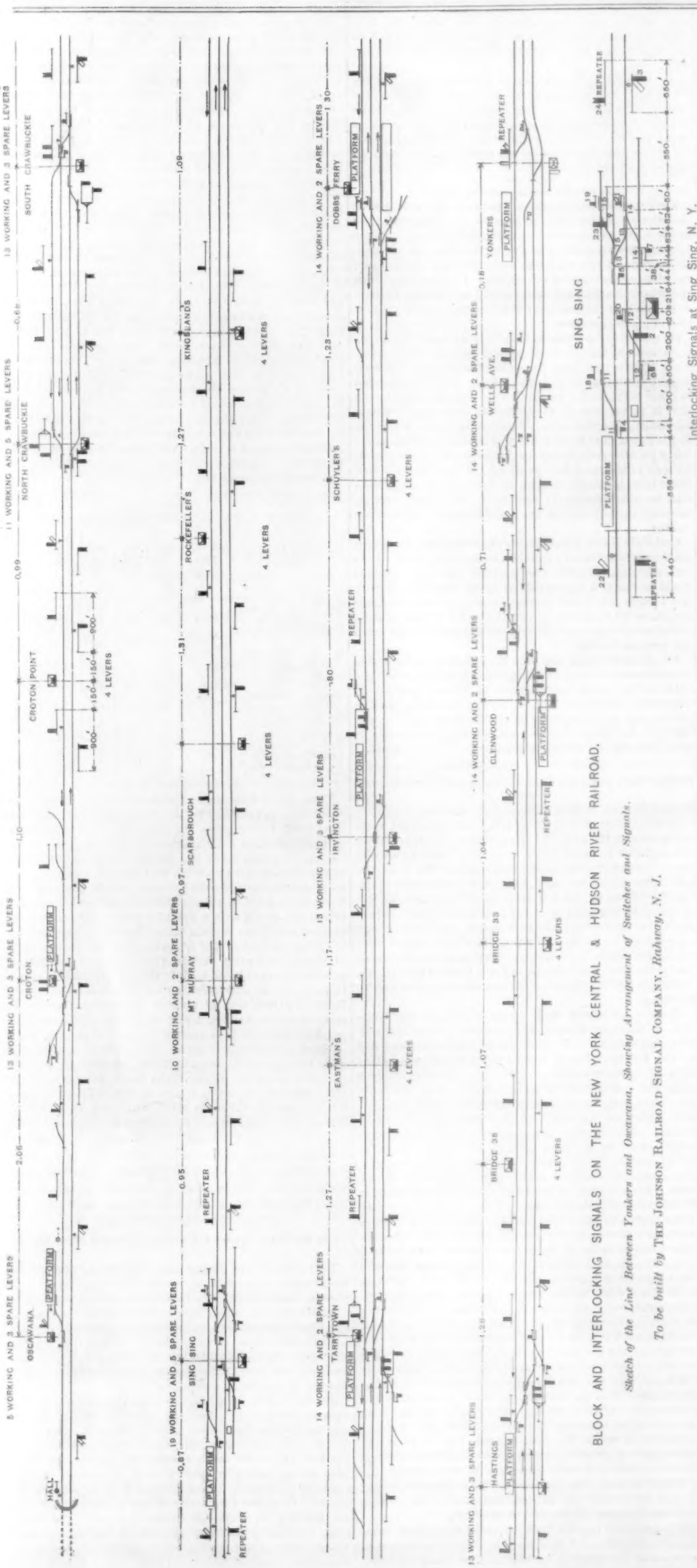
ARTHUR T. WOODS.

[This is the communication referred to in the first editorial note of January 8. Through a lack of coördination between the printing and editorial offices the letter was left out.—EDITOR RAILROAD GAZETTE.]

The St. Paul Railroads and the Wheat Movement.

Very early in the season the railroads of the Northwest began to prepare to handle the great crop. The various roads called in their outstanding cars, the capacity of their repair shops was taxed to its utmost, and considerable new equipment was ordered. As the harvest drew near it was known that the crop was an unusually large one, and when the grain was ripe it was assured that never before in the history of the country had the yield been so enormous.

All the roads held their cars on their own tracks as much as possible, and the rules regarding loading and unloading were more strictly enforced than ever before. The result was that there was improved service and the roads were enabled to handle the business fairly, promptly and without blockades in the yards at terminal points or holding cars on their side tracks. Of course there were delays in furnishing cars for loading in sufficient quantities, but the roads made every effort to keep the wheat moving, so that when the elevators could receive wheat there was no real suffering to the producer; and they did this with few exceptions. In North and South Dakota, under the



BLOCK AND INTERLOCKING SIGNALS ON THE NEW YORK CENTRAL & HUDSON RIVER RAILROAD.

Sketch of the Line Between Yonkers and Oscawana, Showing Arrangement of Switches and Signals.

To be built by THE JOHNSON RAILROAD SIGNAL COMPANY, *Rahway, N. J.*

Interlocking Signals at Sing Sing, N. Y.

laws of those states, cars must be furnished to the farmers for shipping grain and there, more than in Minnesota, that privilege was taken advantage of. The greatest complaint came from South Dakota, and the Railroad and Warehouse Commissioners, after investigating the complaints and the prevailing conditions reported that they were satisfied that the railroads were doing all that could be expected under the circumstances. This was true of all the roads and the cases of genuine suffering were very few.

There were several factors that aided the roads—one of them was the inability of the farmers to prepare the crop for the market and another was the efficiency of the Terminal Dispatch Association and the Lake Superior Car Service Association. It was known early in the harvest season that there were not enough threshing machines in the country where the greatest yield of wheat was, to thresh the wheat. Many of the farmers had made up their minds to abandon the crop, as they feared it would be impossible to save it. The railroads at this point came to their rescue and scoured the country where the harvest was over for threshing machines, which they transported, together with a crew of 10 men for each machine, to the localities where assistance was needed, without charge. In this way much of the grain which would have otherwise been lost to the producer, was saved, and, instead of all the grain being ready at the same time for the market, the producers were not able to prepare it for shipment until later in the season.

The Car Service Associations kept the cars in motion after they arrived at terminal points and by enforcing their rules were enabled to prevent congestion in the yards. Nearly all of the wheat marketed is delivered to elevators at the terminal points,—at Duluth and Superior; of course every bushel is unloaded. In this way several of the roads had very little trouble to maintain the control of their own cars, as they were either on their own tracks or near the tracks of their own lines. Other roads, hauling grain to Milwaukee and Chicago, experienced greater trouble. As it was, by exercising every care and taking advantage of every opportunity, the amount of grain marketed at terminal points was, for the last four months of 1891, about 50 per cent. greater than for the same period in 1890.

Since navigation on the great lakes has closed the movement of grain has decreased. The supply for the mills is still kept up, and the elevators are being gradually filled up. There is still a considerable storage capacity, which will undoubtedly be taxed to its utmost before navigation opens in the spring.

The Northwestern roads have not suffered seriously on account of the blockade in Chicago and the East. They have generally refused to allow their cars to go east of Chicago, and, since the cars and their contents would have been tied up there, they are not accepting shipments of flour or grain to Chicago or the East until the blockade is broken. By so doing they have not imposed hardship upon any one, as the shippers understand the situation and realize that if the roads were robbed of their cars it would be far worse than it is at present.

ST. PAUL, Minn., Jan. 4, 1892.

Johnson Signals on the New York Central.

We print herewith a diagram, not drawn to scale, showing the interlocking and block signals which the Johnson Railroad Signal Co. has contracted to erect on the New York Central & Hudson River road, as announced in the *Railroad Gazette* of Jan. 1. The small cut, showing the tracks and signals at Sing Sing station, is drawn on a larger scale and shows more clearly the method of numbering the switches and signals and the customary distances between the more important points of the plant. The regular distances between home and distant signals, at stations where there are no switches, is indicated in the larger drawing at Croton Point. The figures shown in the broken line indicate the distances in miles between towers. As before stated, these block signals have Sykes locks throughout, the locking apparatus being provided with several improvements added by the Johnson Company. The last station operated by the Sykes system, at Oscawana, is connected with the first signal of the Hall automatic system, which extends northerly from Oscawana. The word "repeater" in connection with a distant signal indicates that there is an indicator in the tower by which the signalman can at all times inform himself as to the position of the distant signal, which is out of his sight.

An Improved M. C. B. Coupler, Dowling Type.

[We are asked to publish the following corrected description of the Dowling coupler. The references are to the cuts shown on page 20 of our issue of Jan. 8.—EDITOR.]

The Standard Car Coupling Co. has now two forms of the Dowling type of coupler, the first named "Standard," and the second "The M. C. B.," both of which are made to meet the requirements of the Master Car Builder's standard and pulling and drop tests of inspection.

The form shown by the accompanying illustrations weighs about 180 lbs.; the knuckle weighs 54 lbs.; drawhead, 120 lbs., and the lock and lifter, 6 lbs.

Fig. 1 shows the coupler complete with the knuckle closed. The lock lifter is protected from injury, as it is

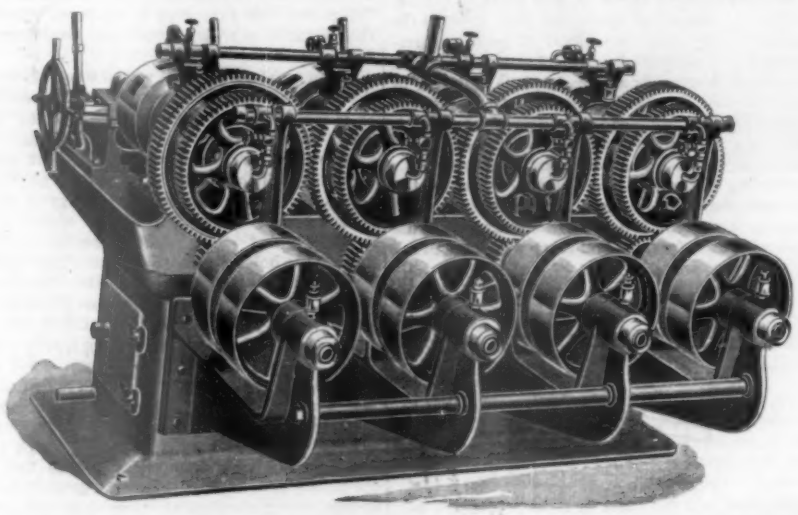
surrounded by the buffer stop. Fig. 2 shows the coupler in detail. The lock consists of a perfectly plain piece of round rolled steel about 3½ in. long. The knuckle has large bearing surfaces, and has the material so disposed as to make it probably the lightest and strongest form into which material can be put within the limits of design of this coupler. The operation of the coupler is best understood from figs. 3 and 4. Fig. 4 is a plan and shows the large segmental trunnion on which the knuckle rotates. The lock is best shown in fig. 3. It is simple and has a large wearing surface. It is lifted by the bent rod, of rolled steel, clearly shown, which passes up through the coupler head from the bottom.

Couplers of this form, but not exactly of these dimensions, being much lighter, have been in use on several heavy grain cars on the New York Central road for several years without breakage or showing unusual wear. It is the success of those couplers which has led to placing the coupler here shown on the market.

One may ask why a coupler weighing 180 lbs. will stand the same tests in a pulling machine and under a drop hammer as other couplers that weigh much more; but the reasons are simple when understood. Malleable iron when thin and of good quality has a comparatively high tensile strength and ductility. "The M. C. B." coupler can be built with a minimum of thickness, as there are no parts of the design which require great thickness. The trunnions are so large in diameter that they can be made thin. This design has a maximum thickness of ¾ in. and a minimum of ½ in. We have seen heads of this sort made of ⅝-in. malleable iron placed under a steam hammer and driven together ¾ in. without fracture, by striking them on the top, the underneath side being on an anvil. Owing to the light weight of this coupler it can be built at a low cost, and it is the intention of the manufacturers to put it on the market and gurantee it in every way, and sell it at a price that will enable them to compete with the lowest prices offered. One of the advantages of a light coupler is that it can be more readily handled in repairing cars, and this is one of the claims which are made for this coupler.

Fig. 5 is an opening device consisting of a chain attached to the under side of the knuckle at one end and to the car at the other. It is intended to comply with the law requiring an "automatic" coupler, which is construed to mean a coupler that does not require the trainmen to go between the cars for any reason. There are now several devices for automatic couplers in this sense. One has a knuckle intended to open by sliding down an inclined plane by gravity; a second contemplates a spring in the head which throws the knuckle open when unlocked; with the one here shown the knuckle is opened by a chain, and another type, of which there are several varieties, has the knuckle opened by moving to and fro the uncoupling rod.

Other points of advantage claimed for this coupler are the position of the buffing shoulders, whereby the leverage and the breakage of knuckles is materially reduced; the location of the link-pin hole in the drawhead, which gives a direct pull when coupled, with the knuckle gone, instead of the shearing strain obtained by coupling to the pivot pin of the other types of couplers, and the fact that the tail bolt can be inserted and the coupler attached to a car without renewing the knuckle or lock.



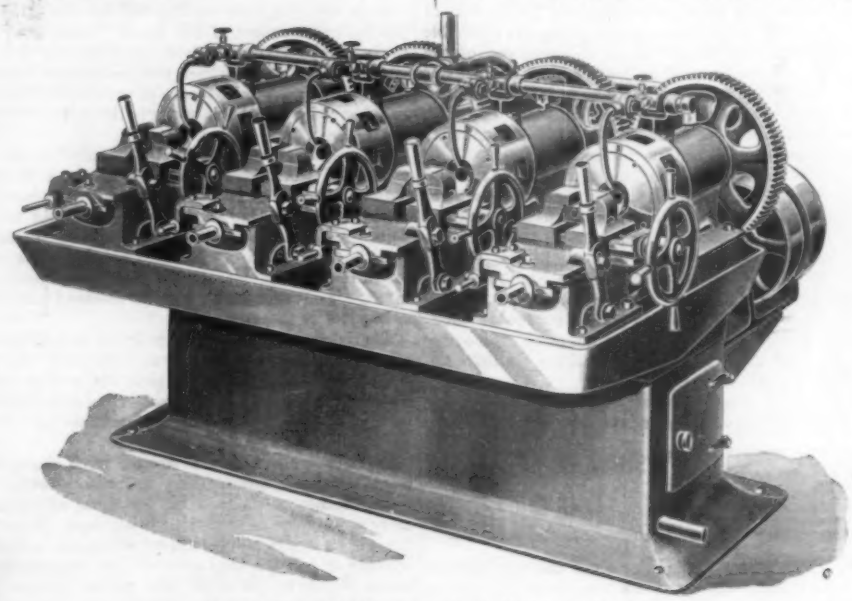
Special Threading Machine.

The illustrations show a special threading machine designed and built by the Acme Machinery Co., of Cleveland, O., for cutting right and left hand threads on track bolts in one operation.

The machine has a box shaped base forming a tank for the lubricant, to which is fastened a cast iron pan carrying the headstocks and carriages. Four brackets are bolted to the rear for supporting the friction pulleys. Each carriage has a vise or holder for the bolt and an automatic reversing gear. The headstocks are made solid, bushed with phosphor bronze, each carrying two spindles, one revolving within the other. These spindles are driven by spur gears as shown, the large gear driving the outer spindle and the small gear the inner spindle, one to the right and the other to the left, at exactly the same speed. Bolted to the front end of each spindle is a steel head or disk having four chasers set radial from the centre, thus forming a solid die.

The friction pulleys are loose on the shaft, and are driven from the counter overhead with quarter turn belts, each pair having between the two pulleys a cone-shaped friction disk, keyed to a rod passing through the centre of the shaft. This rod extends to the front of the machine and immediately under the carriage, and is so arranged as to be controlled by a hand lever on the side.

The lubricant is supplied from a separate tank and conveyed to the dies by means of pipes as shown. The pipes in the front supply the right hand dies, and are made with a hinged joint; those in the rear supply the left hand dies through the centre of the inner spindle, after which it is strained and conveyed to the tank or base of the machine, whence it is pumped through the pipe shown near the bottom.



Special Threading Machine—Acme Machinery Company.

To thread a blank track bolt, the bolt is placed in the holder or vise, and the carriage is moved forward with the hand lever until the point of the bolt enters the right hand die. The bolt is then fed through it to the left hand die. These dies are three-quarters of an inch thick, and are set $\frac{7}{16}$ inch apart; thus it will be seen from the dimensions given that a right hand thread will be cut on the bolt $\frac{13}{16}$ inch in length before the point of the bolt enters the left hand die. Supposing a thread to be cut two inches in length, the left hand thread will then be two inches minus $\frac{7}{16}$ inch long, or $1\frac{9}{16}$ inches. After these dies perform their work and the thread is cut to its proper length, the machine is reversed automatically and at an increased speed. When the bolt is free from the dies the operator draws the carriage backward a short distance by means of the hand lever, which at the same time reverses the machine in the direction for cutting, thus making bolts with a right and left hand thread almost as simply as a right hand thread alone.

Iowa Railroad Commissioners' Report.

Advance sheets of the 14th annual report of the Railroad Commissioners of Iowa for the year ending June 30, 1891, have been issued, signed by Frank T. Campbell, chairman, and W. W. Ainsworth, secretary. The different subjects are printed without any systematic arrangement, and there is some matter of comparatively little value, such as extracts from the daily papers, of doubtful authenticity.

The Commissioners complain that the railroads, in reporting their statistics, do not separate Iowa earnings, tonnage, etc., from the totals of the business on the whole road; but, so far as appears from the report, the demand of the Commissioners was for divisions which it is impossible to make, except on the basis of a very rough estimate. There were killed during the year 82 employés, 5 passengers and 91 other persons; injured, 601 employés, 80 passengers and 92 others. There has been marked improvement in the physical condition of most of the roads in the State, and the Des Moines & Kansas City has rebuilt a portion of its line. The Chicago & Northwestern has built 76 miles of second track. The track of the Clarinda & St. Louis Railroad has been taken up, and another short road has been abandoned, so that there was no increase in the mileage up to June 30, but for the calendar year 1891 the increase is 38 miles, which seems to have been practically all on the Albia & Centreville. The total length of road in the state on June 30 was 8,413 miles. The statistics of stock and debt, equipment, etc., are comparatively valueless, because they either give the figures for thousands of miles outside of Iowa or else are based on inexact statistics for the state by itself. It may be of interest, though, to note that of the 116,356 freight cars reported by the companies, 11,821 had train brakes and 14,994 had automatic couplers.

The Commissioners say that the net increase in tonnage over 1891 was 1,309,832 tons, and that earnings on Iowa business rose from $37,000,000 in 1889 to $43,000,000 1891; but we are still left in the dark as to just what is meant by the term "Iowa business." The Commissioners' rates at the time they were made were said by the railroad officers to be 25 per cent. below those then existing, but the Commissioners claim that

"the effect has been to stimulate Iowa industries by giving them cheap fuel and low rates for getting their produce to market. The tariff has caused the opening of new coal mines, the erection of new mills, has wonderfully enlivened the jobbing interests and reduced prices to the consumers and at the same time largely increased the tonnage and revenues of the roads. To enable Chicago to compete with Iowa jobbers, inter-state rates were reduced and prices cut, and the live competition and reduced rates have resulted in lower prices to the consumer. The farmer gets his supplies cheaper, his lumber, coal, salt and other heavy commodities at fair rates. He finds a market for a portion of his surplus corn, oats, hay, wood, timber, etc., at home and 'saves transportation.' He markets many of his hogs in Iowa packing houses and 'saves freight charges.' Wood and logs that lay in the timber rotting, the Iowa rates are making a market for, and new mills are sawing the latter up for use in excelsior, fencing pickets, handles, boxes and other industries unknown before."

The amount expended for operating expenses in Iowa increased from $23,000,000 in 1886 to $29,000,000 in 1891. In view of the claim of the railroads that reduced rates would necessitate reduced expenditures, the Commissioners think that perhaps this increase is to be accounted for by the explanation that items that ought to be charged to capital account have been included in operating expenses. A table is given of the 15 roads whose lines are all or nearly all within the state, and the earnings of these show increases varying from 15 to 76 per cent. in 1891 over 1888. One line has earned 247 per cent. and another 155 per cent. more than in 1888, but these must be new roads or exceptional cases, and it is not said in the case of any of the lines whether there was any increase in mileage.

The number of employés is 27,583, which is 206 less than in the previous year. This small reduction is entirely from loss of interstate traffic, say the Commissioners. Through traffic from the west has been curtailed by short crops or diverted to St. Louis lines; "and,

while economy is talked about, and cutting down of salaries of the low priced men on the road still goes on, there has been no decrease in expenses, but on the contrary an astonishing increase which has served well one purpose—the reduction of the net revenues on Iowa earnings, but no other. And yet Iowa earnings increase yearly, and Iowa tonnage grows larger continually." The reduction of train crews by the increased use of large engines and cars is also referred to. The taxes paid in Iowa during the year were $1,234,219, which is $10,801 more than was paid in 1890.

Compound Locomotives.

BY AUGUST VON BORRIES.

The number of Worsdell and Von Borries compound locomotives, either in service or in course of construction on Nov. 1, 1891, shows a considerable increase over the similar statistics for the previous year. They were:

Germany	520
Austro-Hungary	10
England (including exports)	611
Italy	2
Russia	155
Switzerland	28
Belgium	2
North America	30
Total	1,358

These figures have risen from 1,034 in the previous year. In the *Railroad Gazette* of Nov. 6, 1891, there was illustrated an improved form of intercepting valve, wherein the operating piston also acts as an air buffer and which has been applied to a large number of locomotives, giving perfect satisfaction and working without any perceptible blow.

Two new eight-wheel, compound, express locomotives have been built with perfectly balanced piston valves, resulting in reduction of wear of the valve faces. These two locomotives have been in service for a year. The piston valves perform their work perfectly, are very easily moved and show, upon the whole, very little wear. Indicator diagrams show a rapid falling off of the admission line, just as with the flat valve, but greater in comparison with the ordinary slide valve. This is attributed to the very small capacity of the steam chest. A further application of this piston valve would seem to recommend itself, but, in order to secure more steam space, it appears advisable to accomplish it by means of an enlargement of the steam pipe to a diameter of at least 6 in. It does not seem worth while, however, to make a further application of the piston valve to the low pressure cylinder, for the steam suffers a somewhat greater reduction of pressure than with the ordinary Allen valve, and all loss of pressure must be carefully guarded against in the low pressure cylinder. The balancing of this valve, which, on account of its size, in spite of the low steam pressure, is desirable, can be accomplished by means of the Richardson designs, the common practice in the United States. The use of piston valves on the high pressure and flat valves on the low pressure cylinders, which finds such a wide application in marine engines of modern construction, seems worthy of adoption in locomotives also, each valve having the qualities requisite for the position in which it is placed.

The principal dimensions of the eight-wheeled express locomotives mentioned above are:

Diam. of high pressure cylinder	17.7 in.
" " low " "	25.6 "
Stroke of piston	23.6 "
Diameter of driving wheels	77.2 "
Heating surface (internal)	1205.6 sq. ft.
Grate area	15.0 "
Weight in working order	99,220 lbs.

In order to test the efficiency of these engines several trials were made. Among others was one of 67 miles on a track with many curves, and grades of 1 in 300 with an express train of 14 cars having 37 axles and weighing 485,100 lbs., covering the distance in 92 minutes (8 minutes below schedule time). For stopping and starting as well as for slowing twice, 4 minutes should be deducted, giving an average of 46 miles per hour. The whole tractive force required for the 628,400 lbs. weight of train was in round numbers 5,700 lbs., so that the locomotive exerted about 705 H. P. on the tire of the driving wheel, or 58.75 H. P. for each 100 sq. ft. of heating surface. The vacuum in the smokebox was from 4 to 4.75 in. of water.

Another test was made on a run of 39.75 miles with a grade of 1 in 400, with a train of 12 cars having 34 axles and weighing about 441,000 lbs., in 54 minutes. For starting and stopping and slowing once, 4 minutes should be deducted, so that 50 minutes remain for the run, corresponding to an average speed of 49 miles per hour. The average traction for the whole weight of the train of 595,000 lbs. was 4,900 lbs., corresponding to an effective performance of 631 H. P. or 52.6 H. P. for each 100 sq. ft. of heating surface. These results are very satisfactory and have hardly been equaled in Germany up to the present time.

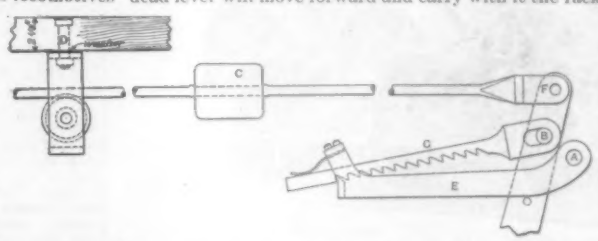
The rapid introduction of the compound engine in Russia is particularly worthy of notice, for the number has risen from 32 one year ago to 155 at present, the Lindner apparatus being chiefly used. Taken all in all it may be safely assumed that the advantages accruing from the use of the compound locomotive are already widly acknowledged, and that their universal adoption for all classes of train locomotion is only a question of overcoming the opposition of theoretical considerations or personal prejudice, which latter is an influential factor.

The Loughridge Brake Slack Adjuster.

This device as shown in side elevation is attached to the dead lever. The guide *E* for the dead lever is hung upon a bracket at *A*, in accordance with the M. C. B. Standard brake gear. *G* is a rack attached to the usual point of fulcrum on top of the dead lever. This rack engages with a tooth cast in the guide. A saddle is cast on the guide through which the rack passes, and a very light spring is attached to the saddle, this spring being of just sufficient power to prevent the rack from bounding out of position. A rod is attached to the dead lever at *F* either by a jaw or hook. *C* is a cast iron weight of, say, 20 lbs., attached to the rod, and there is a carrier with a pulley over which the rod passes. This carrier is attached to the car body at *D*, and works as a swivel in order to accommodate curving.

It is claimed for this device that it is not only automatic in its adjustment of slack, but that it offers the most convenient and reliable method of hand adjustment when such is required for adjusting new shoes, etc.

The automatic feature is attained by the bumping or jostling of the car. The dead lever riding free when the car is bumped in switching or jostled in a train, there is an oscillating movement of this lever about equal to the slack, and observation has shown that the bump of a car in switching throws the slack of the brakes on the forward truck, due to the momentum of the horizontal levers in that direction. When there is undue slack the dead lever will move forward and carry with it the rack



G at every shock, and the tooth or teeth of the rack will engage with the tooth at the tail of the guide in proportion to the extent of the slack. Assuming that in the engagement of the teeth, the shoes are against the wheels, the slot in the rack will permit the dead lever to recede any desired distance to prevent the shoes from rubbing the wheels, and preserve the minimum throw of the piston.

The rod with weight *C* is a counterbalance to the weight of iron brakebeams, and gives a steady and regular movement to the dead lever. The momentum of the weight aids in the throw of the dead lever, and before its inertia can be overcome in the reverse direction the tooth of the rack will have had time to make the proper engagement, and the lever will return to its fulcrum at *B*, and shoes will be released to the extent of the slot at this point.

The rod can be extended to near the end of the car for convenient hand adjustment, and the man who couples the cars or brakehose may pull the rod as far as he can and the slot at *B* will complete the adjustment. Experiments have shown that ten pounds pull upon the rod will properly adjust the brakes.

In trials made with this device, with shoes an inch from the wheels, one ordinary switching bump took up seven notches of the rack, or the equal of nine inches movement of the dead lever. With shoes an inch from the wheels a perfect adjustment was made by hand in 15 seconds, or just the time consumed in walking from one end of the car to the other, and pulling the rod at each end. The shortest time in competition by the old method was 25 minutes for the same service. The economy in time alone, with labor at 15 cents per hour, would (in a weekly adjustment only) amount to more than the cost of equipment in one year.

The M. C. B. Association, in formulating its standard brake gear, declares the dead lever to be the proper point to adjust the slack, and this seems to be important not only in its relation to the air brake, but to prevent too much slack chain for the hand brake. This device is patented by Mr. J. E. Loughridge, 505 Chestnut street, Philadelphia, Pa.

Iron or Steel for Bridges.

BY H. B. SEAMAN.

[What follows is taken from a discussion by Mr. Seaman of Mr. Waddell's paper on "Some Disputed Points in Bridge Designing." The discussion was read before the American Society of Civil Engineers at the meeting of Dec. 2.]

The assumption that "in the near future, the material for the metal portions of railroad bridges will be exclusively steel" seems to me a little premature. The objections to its use have not yet been removed, and although the development of its manufacture has made possible its production with as much uniformity and economy as that of wrought iron, it still has the same objectionable structure. The objection to the use of steel in railroad bridges, is, that it resembles a refined, ductile, homogeneous cast iron, rather than a fibrous wrought iron, and although recent practice has gradually reduced the carbon until its composition approaches more nearly to that of wrought iron, it has never yet been given a fibrous structure. Steel is objectionable, because the least scratch, so fine as to be imperceptible to the closest inspection, may, in time, under vibratory strain, lead to the destruction of the member. No inspection can be close enough to avoid this danger, and the reduction of hardening elements does not eliminate it.

Tests of steel, under constant strain, are of no value whatever as a criterion for its use in railroad bridges. The development of a scratch under a single application of load would not be noticed. The chief care in the maintenance of iron bridges, and the one to which the closest inspection is directed, is the development of flaws in details. A member rarely fails because of overstrained material. There are members in bridges which have been in use for years with strains far exceeding those usually allowed and which are safe, but there are details which to all outward appearance have been perfectly sound, and which have suddenly developed flaws which, had they not been detected before the passage of a train, would have resulted in a bridge failure. It is for this reason that engineers hesitate to adopt a material the character of which favors the development of such flaws.

The general use of steel would seem objectionable for the reasons mentioned but to cite the drifting test as an authority for its use without reaming would seem worse than to depend upon the single application of a load to show the development of slight flaws. "The standard drifting test" is of value only in detecting hard spots in the immediate vicinity of the hole, but cannot develop cracks or scratches caused by punching, the presence of which render reaming necessary. Enlarging the holes by drifting forces the material back upon itself and tends to close rather than to open these defects. It may indicate a soft material, as would also a tension test; but as a demonstation that soft steel does not need reaming the drifting test is a delusion.

The use of steel rails is sometimes cited as an argument for the use of this material in railroad bridges. When bridges receive the same incessant inspection in all their details as do steel rails, or when bridge members can be replaced as quickly and with as little expense as can a broken rail or splice bar, and when the failure of a bridge is attended with nothing more serious than a derailment, then may the general use of steel be advocated for railroad bridges; but until this is true it is well to proceed with caution.

Shop Notes—Cleveland City Forge & Iron Co.

The shop facilities of the Cleveland City Forge have been increased lately and further additions will soon be made. In the hammer shop two large steam cranes have been erected of between 80 and 100 tons capacity. These are set close together and have a total swing sufficient to handle easily any large piece, between the furnace and the hammer block. One man can if necessary operate both without any difficulty, which at times may be convenient. Three additional large hammers have been put in and the blacksmithing department has been enlarged considerably, as well as the turnbuckle shop.

The work in this department is interesting on account of the rapidity with which the manufacture of turnbuckles and jacks is carried on. The machines are specially designed for finishing and drilling, the piece being held at the centre by a flexible clamp so that the taps are self-centring, and the operators are enabled to turn out several hundred a day each. The forging of the turnbuckle is made of four pieces; the two long sides and two short distance blocks at the ends are placed together properly and held in position by a short link, then heated and forged in the press, one end at a time, and are allowed to partially cool between the two heatings. The rolled turnbuckles are made on a special machine having two vibrating dies between which the heated material is forced. Among the larger machine tools used in finishing the work here are a lathe having a 5 ft. swing and 48 ft. between centres; also a 10-ft. lathe and a slotter having 54 inches stroke and a 5-ft. movement to the table.

This company forged the large shaft for the steamer "Pilgrim" of the Fall River line, which was about 40 ft. in length and 27 in. in diameter, weighing about 40 tons. This is not however as heavy as the shafts for the "Puritan" of the same line made here several years ago, which were 30½ in. in diameter, but not quite as long. In turning up these shafts from end to end, the lathe used was of necessity one of heavy build and with the tail stock moved out to nearly the limit, the weight of the shaft being partially taken between end supports. Among other large work done here of late has been a "beam strap" for a Sound steamer, nearly 37 ft. long, 16½ in. wide and weighing between 18 and 19 tons; and the rudder frame for Cruiser No. 2, "New York," which was over 3 ft. thick at the widest portion and having a stock 18½ in. in diameter, was quite a marvel in its way. The other proportions were in harmony with those given, and the whole weighed nearly 14 tons. The contracts were also taken here for rudders for cruisers Nos. 12 and 13, and battleships Nos. 1 and 2, the first two weighing about 15 tons each.

The new turnbuckle shop will be a decided step forward in the general improvement contemplated by the company. This building being entirely of iron, and having a length of 360 ft. and a width of 70 ft., provides for

the economical handling of a large output, and will relieve the heretofore crowded condition. The fact of having the all-iron construction will prove a saving in the item of insurance.

The railroad work done here covers a variety of parts used in equipment and by operating departments, the principal features being axles, links, pins, etc. For stationary engines the work runs largely into cranks and shafts. The location of the plant is well adapted to the class of work done by such a company. The main tracks of the railroads run along the north side of the property, and by private sidings and the use of yard cranes, the facilities for loading and shipping are of the best. This feature in recently costructed plants is, however, not rare, though frequently when a property has grown from small beginnings, the old method of heavy trucking is adhered to per force.

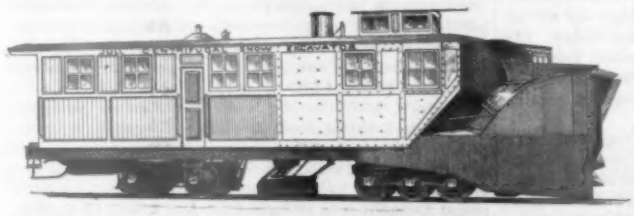
The Jull Snow Plow.

The Jull snow plow has been altered in several particulars in the past season. During last winter this plow received hard usage in the West, and advantage has been taken of all the experience gained to improve the machine. There is a decided improvement in the screw, which has been simplified, and all braces and projections removed from the parts where the snow slides over the surface of the blades. The accompanying cuts from photographs show the external appearance and general location of the parts. The following is a description of the main features of this plow:

There is an underframe constructed of steel channels with suitable heavy transoms for the trucks. Securely attached to the front end of this frame is the hood in which the conical screw revolves at a speed varying from 250 to 300 revolutions per minute. The boiler is placed on top of the frame at the rear, and has the following dimensions: Firebox, 84 × 51 in., 5 ft. 3 in. deep; shell, 58 in. in diameter with one dome 30 in. in diameter, 24 in. high; tubes, 190, 2 in. in diameter, 11 ft. long; length of boiler over all, including smokebox, 21 ft. 6 in. The feed-water is supplied by two No. 8 injectors. The cylinders are almost identically the same as those ordinarily used for locomotives. The guides and crossheads are of the Laird type. The cylinders are 18 × 24 in. and are attached to the smokebox end of the boiler and to the channel steel frame. The cylinders are inclined considerably and are connected by main rods to a crank disc and shaft. The link motion is driven by eccentrics. On this crank-shaft is one bevel gear which drives a corresponding bevel gear, which is on the end of the shaft of the conical screw.

The whole frame, boiler and engines, are inclosed in a cab, as shown, and a lookout is placed in the roof. The fronts and sides of the lookout are fitted with double glass. A signal cord extends from this point to a gong placed over the engineer, whose position is on the right hand side of the boiler about the middle of its length. An ordinary locomotive tender is attached to the back end of the plow on which the fireman stands in firing.

The cone is made of steel ⅜ in. thick. It is 12 in. in diameter at the small end and 30 in. diameter at the large end. The blades on the cone make about three-quarters of a revolution in the length of the cone. They are pressed to shape in dies made for the purpose. The outlets for the snow are at the top. They are about 5½ ft. long and 24 in. wide. The one for throwing the snow to the right of the track extends 10 in. above the top of the main frame upward for about 5½ ft., while the outlet for throwing the snow to the left extends from



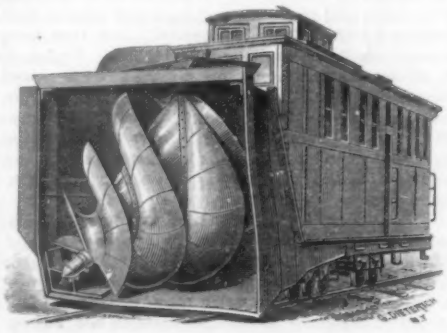
the top of the right hand outlet to a distance of 5½ ft. across the top. Both of these outlets are covered with close fitting doors operated by screws and cranks. Only one outlet is used at a time.

The machine when at work is pushed ahead in the snow by one or two locomotives. The lower edge of the shovel is from one to two inches above the top of the rail, and the snow is thrown from 30 to 40 feet from the track, according to the circumstances. The operation of the machine is as follows: A rapidly revolving cone with spiral-shaped, curved blades gathers the snow which comes in contact with the blades and carries it to the top of the screw and there it is ejected by the centrifugal tendency which it has acquired. The square shaped front edge of the shovel cuts its way into the snow and brings all the snow within its limit into contact with the rapidly revolving cone.

Underneath the plow is the flanger. This is ingeniously mounted on a parallel motion and so arranged that its lower edge can be dropped to the top of the rail. It is adjusted so that if it strikes an obstruction it will swing backward and upward, thus relieving itself. It may be raised quickly or lowered, as desired, by a steam cylinder operated by a lever conveniently placed for the engineer.

Underneath the front end there are two large shoes, one on each side, so arranged that they will travel but a short distance above the rail, and in case the truck should drop into a hole in the track, or if for any reason the front end of the plow should be lowered considerably, these shoes touch the rail before the bottom of the hood, and thus prevent its doubling up. These shoes are also useful in case of a derailment. In such cases, the shoes, being very wide, do not leave the rails, and act as skids to assist in replacing the plow.

The trucks are especially made for these plows out of heavy plates. The springs are in groups of four each, mounted on each side of the centre and connected with equalizers. The truck for the front end has six wheels,



while that for the rear has four. The front truck has an adjustable centre bearing with set screws and check nuts.

This machine is simple and the workmanship and design of detail reflect credit on the Rogers Locomotive Works, who have built it.

The Railroad Rates Question in England.

BY W. M. ACWORTH.

In my last article (*Railroad Gazette*, Jan. 1), I gave a rough sketch of the methods adopted in finally settling the form of our new statutory schedules of maximum rates, and pointed out what principles appear to have guided the committee in coming to a decision on the various points submitted to them. In this letter I propose to give a brief abstract of the contents of the new schedules themselves. Nominally, English railways have always had a classification and a schedule of maximum rates fixed for them by act of Parliament. But the classification was usually only three or four classes, and seldom contained as many as 50 articles. Articles not specifically mentioned—in other words, at least 19 out of 20 modern articles of commerce—were lumped together in the highest class as "all other wares, merchandise, articles, matters and things," for which the companies were authorized to charge as a rule from threepence to fivepence per ton per mile. A great modern company, the product of 50 amalgamations, extending over half a century, had possibly in force in different portions of its system 50 different statutory classifications and 50 various maximum rates. Moreover, these charges were only for conveyance along the railway. For loading and unloading the goods at either end the companies had an unquestioned right to demand any sum they pleased, subject, of course, to an appeal to the court of the Railway Commissioners as to the "reasonableness" of the charge. Further, all companies claimed, and after a long course of litigation, most companies had established, the right to make yet a further charge under the name of "station terminal" for the use of the goods depots and the fixed plant used in connection therewith. Yet again, in England the custom is for the railway company to collect and deliver at the two ends of the journey everything except commodities such as coal and unmanufactured iron; and for these services too a reasonable extra charge at the discretion of the company could be legally made. (Of course this appalling complication of charges did not exist in practice. What actually happened was this: From A to B, let us say, a distance of 50 miles, the company charged perhaps 250 pence for the carriage of a ton of furniture. The weight, the rate per ton, and the total charge were the only figures in the invoice delivered to the consignee. The latter had, however, a legal right to claim that the company should "dissect," to use the technical phrase, this charge. When dissected, the account would read somewhat as follows:

	s.	d.
Conveyance, 50 miles (viz., 35 @ 3d and 15 @ 4d.)	13	9
Use of stations, A 1s. 6d., B 1s	2	6
Loading and unloading, use of sheets, etc	6	0
Carting at A	5	0
Delivery at B	3	6
Total	30	9

In other words the company would point out to its customer that while he had only been charged 20s. 10d., legal justification was claimed for a charge nearly half as big again. Of course the practical result of all this was that no one could under ordinary circumstances dispute the legality of any charge that was made. The shipper was protected from extortion by the force of competition and of public opinion, but the nominal protection of statute law was almost absolutely worthless. It was only very rarely that cases were brought before the Railway Commission. When they were it happened now that a railway company was deprived by the action of an obsolete statute of a rate which morally and commercially speaking could be amply justified, or again that the law held the company harmless in charging a rate that as a matter of practical fact was extortionate. Either result was equally unsatisfactory to all reasonable men.

But this state of things already belongs to past history. We are hardly likely to see any more litigation as to the legality of rates under the old statutes, and from the 1st of August next, as has been said, the new schedules come into operation. Broadly speaking, they may be said to enact in outline the existing railway practice. They divide themselves naturally into three main heads, general conditions, maximum rates, and classification. Dealing with the latter first, the new classification may be said to be a revised and simplified edition of the clearing-house classification, which has been used, though not exclusively, all over the country for many years past. It contains something over 2,000 entries, divided into eight classes, known as follows, reckoning from below upward, A, B, C, 1, 2, 3, 4, 5. The lettered classes comprise the articles of large bulk and small value which are sent us a rule in truck-load quantities, and can be loaded and unloaded without risk of damage in the open air. Classes 1 to 5 comprise ordinary merchandise and manufactured articles, which need to be handled under cover of a goods shed. As a further distinction, it may be said that in practice classes A to C are commonly loaded and unloaded by the shippers; classes 1 to 5 are almost always dealt with by the company itself. The minimum weight of consignment in classes A and B is four tons, in class C, two tons; while in the numbered classes any consignment of over 3 cwt. is entitled to be sent at tonnage rates. Consignments below 3 cwt., technically known as "smalls," are liable to an additional charge varying in rough proportion to the tonnage rate and ranging from 5d. to 1s. 6d. per parcel. Two points may be added on this head. The one that there is nothing with us higher than fifth class. Drums, for instance, which in the American official classification are four times first class, are with us simply fifth. The other and more important point is that our whole classification is pitched, if I may use the phrase, in a very low key. For example, one quarter of the entries in the American classification are in the highest class. With us the number is something like one-twelfth. The percentage of tonnage belonging to class I in one month from New York to Chicago was on one occasion, according to figures given to me on the best authority, 22.2 of the whole. Corresponding figures have been worked out on two occasions for great English railways, and they give as the proportion in our highest class 2.50 and 3.75 per cent., respectively.

As for maximum rates, the best way to make them clear to American readers is to set down in full the schedule of the leading company, the London & Northwestern Railway, which may be fairly taken as typical of the whole.

In respect of merchandise comprised in the undermentioned classes.	Maximum rates for conveyance. For consignments, except as otherwise provided in the schedule.				Maximum terminals.					
					Station terminal at each end.	Service terminals.				
	For the first 20 miles or any part of such distance.	For the next 30 miles or any part of such distance.	For the next 50 miles or any part of such distance.	For the remainder of the distance.		Loading.	Unloading.	Covering.	Uncovering.	
	Per ton per mile. d.	Per ton per mile. d.	Per ton per mile. d.	Per ton per mile. d.	Per ton. s. d.	Per ton. s. d.	Per ton. s. d.	Per ton. d.	Per ton. d.	
A.	0.95	0.85	0.50	0.40	0 3					A.
B.	1.25	1.0	0.80	0.50	0 6					B.
C.	1.80	1.50	1.20	0.70	1 0	0 3	0 3	1	1	C.
1.	2.20	1.85	1.40	1.0	1 6	0 5	0 5	1.50	1.50	1.
2.	2.65	2.30	1.80	1.50	1 6	0 8	0 8	2	2	2.
3.	3.10	2.65	2.0	1.80	1 6	1 0	1 0	2	2	3.
4.	3.60	3.15	2.50	2.20	1 6	1 4	1 4	3	3	4.
5.	4.30	3.70	3.25	2.50	1 6	1 8	1 8	4	4	5.

In criticising these rates and comparing them, or contrasting them, with rates in force in the United States, American readers must bear in mind the following considerations. The English ton is 12 per cent. more than the American ton. These rates are not actual rates, but statutory maxima. Though unquestionably for retail traffic for short distances the actual rates approximate very nearly to them, the bulk of the trade of the country, more especially where the distances are over 50 miles, is done on a very different scale of rates. Shipping rates for large consignments are frequently less than half the ordinary retail rate. Again the statutory schedules are all at company's risk as are the ordinary rates in the rate books, but in nearly all cases shippers can obtain owner's risk rates at a reduction of from 15 to 25 per cent. On the other hand, it is only fair to add that on certain small branches, where mineral traffic is worked for distances of only a few miles over heavy gradients, the conveyance rate in Class A is raised to 1.25d. per ton per mile, and in three or four instances even as high as 2d.

It will be observed that by the schedule given above the power of the companies to make arbitrary charges is very largely curtailed. Henceforward their right to charge terminals, both station and service, in all cases is unquestionable. But the recognition of the right is coupled with a limitation of the charge to an amount that will hardly more than cover the average out-of-pocket expense. It is positively laid down in the act that, under the heading either of conveyance or of terminals, every possible item of charge shall be comprised, except those which are specifically mentioned as extras, the most important of which are the collection and delivery of merchandise by the company's carts "before or after conveyance on the railway." It is further provided that, if any portion of the terminal service is not rendered, the fact that the company went to the expense in making preparations to render it shall not justify any charge being made therefor. There has been a long standing feud between the companies and a certain section of traders, who claim the right to come into the stations and do their own loading and unloading themselves. The Act settles the dispute by the following ingenious compromise. The goods sheds are reserved for the companies' exclusive use, but where a shipper sends an entire truckload of goods which are ordinarily loaded and unloaded out-of-doors, the company which "unreasonably" insists on performing the loading and unloading itself, is forbidden to charge the trader the cost of the work. Hitherto the companies have claimed the right—which in a few instances the conditions of trade have enabled them to exercise—of charging demurrage for detention of trucks. In future the obligation will be reciprocal, and the trader whose trucks are unreasonably detained by the company, will, in his turn, have a claim for demurrage against them.

One point more. All the rates given above apply of course to goods trains only. To persons who insist on sending their goods by passenger train the railway may make what reasonable charge it pleases, and, considering the great speed and promptitude of the English goods service, this seems only fair. There is, however, one exception of considerable importance, now introduced for the first time. Consignors of "perishables," daily products, that is, fish, flesh, fowl, fruit, vegetables and ice, can henceforward claim to have these articles forwarded at statutory rates, "either by passenger train or by other similar service." It is added, however, that "such facilities shall be subject to the reasonable regulations of the company for the convenient and punctual working of their passenger train service, and shall not include obligations to convey perishables by any particular train." One of the fiercest fights in the whole discussion before the Parliamentary Committee took place on this perishable schedule. The agriculturalists are a class with whom it is the fashion to sympathize at the present moment, and, after undergoing three consecutive reductions, the rates for milk have been finally fixed at a point which will compel some of the railway companies—so at least their goods managers declare—actually to work the traffic at a loss. But after all milk is a small matter. On the whole it may be said that the nine railway companies whose schedules were dealt with last session have got off cheaper than at one time seemed likely, and it does not seem probable that the measure meted out to the rest of the railways in the ensuing session will be in any important respects different from that which the leading companies have already received.

Safety Legislation.

Attempts at national legislation for the safety of railroad employés continue. We recently had occasion to comment on the bill introduced by Mr. Cullom in the Senate, Dec. 15. Jan. 5 three bills were introduced in the House of Representatives, all of which are designed to compel the use by railroads of driver brakes, power train brakes and automatic freight car couplers.

A bill introduced by Mr. Henderson provides that from the passage of the act driver brakes must be used on all new locomotives, and that 24 months after the passage of the act it shall be unlawful to use a locomotive not so equipped. New cars, or cars undergoing general repairs, must be equipped with safety couplers, and after January, 1897, it will be unlawful to use cars without such couplers. After Jan. 1, 1895, it is made unlawful to run trains without enough power brakes to control them without the hand brake. To secure a uniform system of coupling the use of the standard established by the American Railway Association will be enforced. Any company which has equipped enough cars to meet the requirements of the law may refuse to receive from connecting lines cars not equipped with safety couplers and train brakes. The railroads are required to report annually to the Interstate Commerce Commission the number of freight cars controlled by them which are equipped with safety couplers and train brakes, and also the name and make of such coupler and brakes.

The bill introduced by Mr. O'Donnell also provides that new cars and cars undergoing general repairs shall be equipped with automatic couplers, and that such equipment shall be complete by Jan. 1, 1894. By Jan. 1, 1893, all locomotives must be provided with power brakes, and by Jan. 1, 1894, enough automatic train brakes must be provided to control trains. The Interstate Commerce Commission shall secure a vote on the form of coupler to be used, from common carriers and from employés, the latter to vote through their organizations.

A bill introduced by Mr. Milliken has some novelties. It provides that each car shall be equipped *on each end* with a safety automatic coupler. We do not remember that any other law maker has made this precise stipulation. Furthermore, the coupler must be such as will not require constant attention, supervision and adjustment by a man. It must be so constructed as to allow a variation in height of cars of not less than 4 in.; all parts must be of cast steel, of a quality to resist a pulling strain of 60,000 lbs. to the square inch, and it must act as its own buffer. It must admit of coupling with other types of couplers now in use, without any increase of danger to brakemen; must be effective in keeping cars together; must not uncouple on curves; must be arranged to be uncoupled from sides, platform or tops of cars and must be easily repaired. This ideal coupler is to be selected by a board of three persons appointed by the Interstate Commerce Commission, to have salaries of $2,000 a year each. The sum of $50,000 is to be appropriated for salaries, expenses of testing and of enforcing the act for three years. The Secretary of the Treasury is authorized to pay $100,000 to the patentee or owner of the coupler selected for the relinquishment of his patents. What is to happen to him if he does not choose to sell out for $100,000 is not specified. Thirty days after the car owners and car builders are notified of the selection of the universal coupler they must begin to equip their cars with it, and every new car or every car repaired shall be equipped under a penalty of $100 for each car not equipped. The fines are to be collected by the Interstate Commerce Commission, and paid into the treasury to be used for the benefit of persons suffering injuries in coupling cars not so equipped. The application of these couplers must proceed at the rate of not less than 15 cars a week for each company, under a penalty of $50 for every car less than 15 per week not so equipped. This act is to be inforced from its passage, and, altogether, it is a "high novelty" in safety legislation.

A Brief Summary of the Elevated Railroad Cases in New York.

J. S. WOOD, ESQ.

In the growth of cities no greater or more useful device for increasing the use and value of thoroughfares has ever been practically demonstrated than the elevated railroad system as it exists in New York to-day. The roads will always be useful, if not adequate, and if in due time they are run by means of electricity instead of steam, it is probable that the actual damage to abutting owners will be less than it has been.

Five classes of persons have so far regarded themselves as injuriously affected by the railroads: The surface railroads; abutting owners of the soil of the street; abutting owners, who did not own the soil of the street; owners of vaults under sidewalks by municipal permit; owners of lots near the Battery and Bowling Green, under deeds from the city corporation, with park covenants and street covenants.

Of these classes of complainants abutting owners not owning the soil of the street have been most numerous, the "land damage" suits being already in the thousands; for such has been the course of litigation and decisions that every one having property on the line of the road wherever situated, with the exception of certain parts of Sixth avenue, considers that his property is injured and that he is entitled to some damages. The history of the litigation shows largely an effort to apply the common law to a new condition of affairs. The decisions show a curious contrast as applied to surface and elevated railroads, the same injuries being held actionable in one case and not in the other. The reasoning of judges when met with new conditions is sometimes difficult to follow.

The New York Elevated Railroad Company, constructed along Ninth avenue and Greenwich street, was organized as the successor, after foreclosure, of the West Side & Yonkers Patent Railway Company. This company was organized in 1866, under the general railroad law of 1850, c. 140, as amended by L. 1866, c. 697, as afterwards further authorized by L. 1867, c. 489. This act permitted a structure of iron columns, but the railroad was to be run exclusively by stationary engines and the cables. It also required compensation to be made for interference with vaults, etc., and required five per cent. of certain net income to be paid into the city treasury as a compensation to the corporation for the use of the street. It also declared the company "liable for all damages which may result to private property by reason of the construction of the road." June 3, 1868, an act was passed (2 L. 1868, c. 855) called an act supplementary to that of 1867 previously quoted. The act enabled the company to make use of steam, and regulated the payments for vaults, removal of awnings, etc., in the street. Under these acts the Ninth avenue line was built and dummy trains run by the company.

The Gilbert elevated railroad was organized under a a special charter (2 L. 1872, p. 2179, c. 885). Its line ran along West Broadway, South Fifth avenue, Amity street, Sixth avenue, etc. This act required that "the tubular ways and railways should be supported above the middle of the streets and avenues by iron arches, which should span the street from curb to curb."

On June 18, 1875, the famous Rapid Transit Act was passed (L. 1875, c. 606). This was a general act, entitled, "An act further to provide for the construction and operation of a steam railway . . . in the counties of the state." This act provided that the Mayor, on petition of taxpayers, might appoint Rapid Transit Commissioners to determine the necessity of any proposed steam railway, and to locate the route thereof through the streets and byeways. The consent of the owners of one-half in value of abutting property was first to be obtained,* as well as the consent of the local authorities, or else that the Commissioners appointed by the Supreme Court give their approval after hearing all parties interested. The Rapid Transit Commissioners laid out a route upon the lines of the Gilbert Elevated Railway on Sixth avenue, and on the Bowery and Third avenue, on the east side. In December, 1875, a majority of the owners on the Bowery refused their consent. Commissioners were then appointed by the Supreme Court on the petition of the New York Elevated Railroad Company to determine under the act whether the road should be built. On behalf of property owners, the granting of leave was resisted on the ground that some of them owned the soil under the street; that others owned abutting lots where the soil under the adjacent street had been originally taken by the city to be held in trust as streets forever; also that the statute failed to provide for any compensation for injuries by means of the use of the street by an elevated railroad. Litigation followed the affirmative report of the Commissioners, and the Court of Appeals finally affirmed their decision (Matter of N. Y. El. Ry. Co., 3 Abb., N. C., 401). This important decision settled the law in this state that it is competent for the legislature to delegate to commissioners the power to determine on the necessity for railroads on the petition of the applicants and to fix the route and prescribe the plans of the same, etc. The court also held that "if abutting owners have any rights to compensation the payment thereof is provided for by the acts applicable to that company," but the question whether abutting owners had any easement or right for which they were entitled to any compensation was expressly avoided.

In March, 1876, John Patten brought the first action recorded against the elevated roads. (See case reported, and note 3 Abb., N C., 397.) This case was carried to the Court of Appeals, but the appeal was dismissed on technical grounds (67 N. Y., 484). The case decided that a vault under a public street which interferes with any public use of the street becomes a nuisance, also it is not "property" if enjoyed by sufferance of a license from the city. Patten tried to enjoin the laying of a foundation for an iron post but failed.

In April, 1876, the Sixth Avenue Surface Railroad brought an action against the Gilbert Elevated Co. to enjoin the construction of the road on Sixth avenue, on the grounds that the structure was not authorized by the original charter, and could not be under the Constitutional Amendments of July, 1874, Art. 3, Sec. 18, forbidding the legislature to pass a local bill granting to any private corporation the right to lay down railroad tracks, also on the ground that the Sixth avenue company were the previous grantees of the route and were specially injured, and that they were owners of property on Sixth avenue for which no compensation was made 3 Abb. N.C., 467). The decision of this case by Judge Curtis is an admirable presentation of many of the various points overruled later by the Story case.

In April, 1876, Jeremiah Spader (see 3 Abb., N. C., 467), owning a lot on Bridge street, under title derived from the city, brought an action to enjoin the company from extending its line across the Battery. This case also came before Judge Curtis, who held that the use by the elevated road of the street comes within the limits of what is known as a public use, being improvements of a public character or those in the use of which the public at large may be sharers and may receive a benefit, and hence individual rights must be subservient to them.

In February, 1877, Rufus Story, holding land in Front street under deed from the city corporation with a

* The courts have held that even where the abutter gave this consent to the building of the road, he could still sue and recover damages for "the taking of his easements." (White v. Met. El. Ry.)

clause that the street should remain open as such forever, brought an action to restrain the extension of the New York Elevated Railway past his premises on the ground of this covenant in regard to the street. At Special Term, Judge Robinson held that an abutting owner was not entitled to compensation for an authorized use of the street in front of his premises by an elevated railway. The decision of this case (now commonly called "*the old story*") was sustained by the General Term of the Common Pleas, and reversed by the Court of Appeals (90 N. Y., 122). The final opinion was delivered by Judge Tracy, the court being divided four to three.* This opinion substantially settled the rights of abutters owning a fee in the street, to recover damages, and that they possess as incident to such ownership easements of light, air, and access in and from the adjacent streets for the benefit of abutting lands and that the appurtenant easements constitute private property of which they cannot be deprived without compensation. The action was brought in equity for an injunction, and the Court, having reached the conclusion that defendant's structure was an unlawful invasion of the plaintiff's easements, granted the injunction, postponing its actual issuance, however, until after such reasonable time as would enable defendant to acquire plaintiff's rights by agreement, or by compulsory condemnation proceedings. While the Story case was pending the famous Caro case (Superior Court), on Fifty-third street, between Sixth and Ninth avenues, was decided against the abutter at special term and was reversed on appeal to the general term. Judge Pryor and Ben Butler were plaintiff's counsel. It may be said that the reasoning in the Caro decision decided the Court of Appeals in the Story case.

The Story case, however, did not establish any rule of damages. But in Uline vs. N. Y. C. & H. R. R. Co. (101, N. Y. 99), the general question as to the scope of the remedy of an abutting owner in an ordinary legal action for damages was fully considered, and it was held that the plaintiff could recover temporary damages only, or such damages as had been sustained up to the time of the commencement of the action, and the judgment of the lower courts, so far as it awarded damages for "permanent depreciation," was reversed. The assumption that a wrong *would* continue even a single day was held erroneous. The common law remedy therefore was held in this case to be for the injuries for the six years prior to the commencement of the action, determined by the annual losses of rents for these years. The Lahr case followed (104 N. Y. 270), asking for "permanent" damages, as well as an injunction, and settled once for all the right of any abutting owner of the fee to recover for injuries to his property. But the case decided no law as to this point, as the parties had stipulated as to the rule of damages.

The New York National Bank vs. Metropolitan Elevated Railway (108 N. Y., 660), reaffirmed the Uline doctrine. The New York National Bank case was an equitable action brought by an abutting owner who was awarded judgment for past loss of rentals, and an injunction was granted restraining the further operation of the road unless the defendants paid a certain sum equal to the amount of depreciation in the fee value of the property, "as for a permanent appropriation." The Pond case followed (112 N. Y., 189), reviewing the above cases, and establishing the rule as laid down in the National Bank case. "A recovery," say the court (p. 199), "for damages for a trespass or invasion of an easement does not operate to transfer the title of the property to the defendant, either before or after satisfaction, nor does it extinguish the easement. By the ordinary rule it is indemnity for a past wrong, leaving unaffected plaintiff's right to his property." The rule of damages was placed upon the proposition that the road and its operation imposed upon the street an *unauthorized use*, and was illegal, and a trespass against abutting owners not duly compensated. Though hardly a philosophical basis of damages it is considered a fairly just one, and one essentially derived from the law. But the fact remains that the individual cannot recover for the thousand other vicissitudes affecting his property in a great city, and even the increased use of the street by railroads, if they are on the surface of the street, is considered *damnum absque injuria*. (Fobes case, 121 N. Y., 518).

Prejudiced juries, referees and judges have sometimes awarded almost punitive damages against the elevated roads. These heavy awards are traceable chiefly to the Drucker case (106 N. Y., 162) which held it to be a logical consequence from the decision in the Lahr case that the damages recoverable included whatever of injury or inconvenience resulted from the structure itself or were incidental to its use. This rule opened the door to proof of every injury traceable to the road or its operation, and was said to be that "however the damage may be inflicted, provided it be effected by an unlawful use of the street, it constitutes a trespass, rendering the wrongdoer liable for the consequences of his acts." So, evidence was held competent that since the building of the road the trade and business of the street had fallen off, and the amount of custom diminished in volume, and changed in character, and to estimate the plaintiff's individual loss the nature and extent of the general injury was properly considered; and furthermore that the judgment against the company as a wrongdoer *must* involve more or less *of estimate* and *opinion* (an exceedingly dangerous doctrine, by the way), and that it was proper to consider as elements of damages to the use annoyances caused by smoke, gases, ashes and cinders from passing trains, the lessening of light caused by the structure and the passage of trains, and injuries caused by drippings of oil and water.

The severity of the courts has been perhaps assisted by the attitude of the management of the roads. The company has in the operation of its road seen great changes in the immediate vicinity of its lines, and along the streets in which the lines are laid. It has seen that this development is due solely to the rapid transit facilities furnished by it. Naturally its managers have felt that, as it was the agency which has conferred the benefit, it is unjust that it should be mulcted in damages, not because it has damaged property, but because it possibly has benefited property in the cross-streets more than property on the line of the railroad. If they have conferred a benefit it is surely unjust that they should be stigmatized as "wrong-doers." But every court of the state has reiterated the theory of trespass and called the railroad a wrong-doer, although the railroad was backed by legislative and municipal authority.

The Lahr case, above cited, as we have said, decided that an abutter having no especial interest in the street could recover for injuries by the taking of his easements as well as the abutter protected by a covenant. Had the court taken a different position in this case the vast amount of litigation would have been prevented. The streets in which the elevated roads are located are for the most part laid out under the Act of 1813, which were "In trust, nevertheless, that the same be appropriated and kept open for a part of public street . . . forever in like manner as the other public streets . . . in the said city are and, of right, ought to be." It was held "that a trust arose under the Act of 1813 on part of the city as in case of a covenant as in the Story case, and that the abutters being liable to assessment for street uses it would be little short of "legalized robbery" to take these benefits from them by permitting an elevated road to be built before their property without compensation" (see H. H. L. R. 116). There were certain other streets on the line of the road which were originally Dutch highways, such as Pearl street and the Bowery, etc. By the Dutch law the municipality owned the fee of the streets, subject to no trust in behalf of the property owners. It was contended that when the English succeeded to the municipal control of New Amsterdam the rule of Dutch law prevailed. The argument was based on the authority of Dunham v. Williams, 37 N. Y., 251. But the Court of Appeals in the Abendroth case, 122, N. Y., 1, held that the point taken was immaterial, as the abutting owner has certain vested rights and easements in the street irrespective of the ownership of the roadbed. It denominated these rights as "property" and brought the case within Art 1, Sec. 6, Constitution, "Nor shall private property be taken for public use without just compensation."

The rights of property and rule of damages being thus determined as to all abutters, questions arose as to the ownership of the abutting property. The roads began to be constructed in 1876 to 1879. The Story case was decided in 1882. Abutting property had been transferred, sometimes with a reservation of causes of action against the elevated roads, and sometimes without. It would seem hardly just that a subsequent purchaser should, having paid less for his property on account of the presence of the elevated structure, still sue and recover damages which he himself had not suffered. The courts, however, were ready with an ingenious, and, it may be said, a purely legal reason for sustaining the decision of Judge Ingraham in Glover v. Man. El. Ry., 51 Super. Ct., 1, viz.: "It can make no difference at what time he (Glover) became the owner of the property, he is entitled to be protected against an unauthorized appropriation, whether it was acquired by him before the defendants appropriated it, or on the day before the commencement of the action." The decisions view the acts of trespass as continuing from day to day, not as having been once for all committed in the original construction of the road and consequent *invasion* of the abutter's rights. Each day, it is held, a new trespass and a new cause of action arises. (See Pond case, 112 N. Y., 188.) A property owner cannot sue in law and recover the permanent damage to his property. He can only recover the past rental damages accruing for six years of trespasses prior to the commencement of the action or since the date of his ownership.

This being so, abutters have had recourse to equity and brought actions for past, present and future damages by asking for an injunction against the operation of the road, and that the structure be removed. Courts of equity take jurisdiction to avoid a multiplicity of suits. They decree an injunction and award as incidental relief the rental damage suffered six years to date of trial, and insert an optional clause or judicial "favor" to defendants that upon tender to plaintiff of a certain additional lump sum for his easements appurtenant to his premises, no injunction shall issue. *Hence*, when the property is conveyed to a *subsequent* purchaser, the grantor can recover at law only for the past rental damages within six years of his beginning his suit*; while the grantee can sue in equity for an injunction, and obtain the "alternative" relief of his "lump sum," or his injunction against future or permanent damage (Pappenheim case, Court of Appeals, October, 1891, not reported). This may be good law, but it is hardly justice. The subsequent purchaser is not injured, yet he obtains by means of his "alternative" relief, by his equity suit sums from the railroad company sometimes amounting to a third of the present value of his property. In the case where the grantor has expressly reserved the right to sue, the same rule prevails, since one cannot reserve a cause of action to begin in the future, and to reserve his easements would, as has been said, be in derogation of his deed, as they are of no value in law separate from the land.

(TO BE CONTINUED.)

* Three judges of the Court of Appeals and four of the Common Pleas, therefore, were opposed to Judge Tracy's opinion.

* See Pond case supra and 4 Harv. Law Review, Art. El. Roads.

Electric Train Lighting in Switzerland.

Electric lighting for trains in Switzerland first received attention in 1887, experiments being conducted in a small way on several of the Swiss railroads with storage battery systems. Interest was prominently taken in these experiments by the Southeastern road, and several of the company's cars were fitted, early in 1889, with the Huber accumulators made by Blanc & Co., of Marly-le-Grand, near Fribourg, Switzerland. Taken altogether, the method proved fairly satisfactory, the accumulators themselves wearing much better than had been expected. At about the same time the J. B. L. road had a number of its cars fitted up with the same system and put into regular service. Both roads together had some eight or 10 such experimental cars, and after the consolidation of the two roads it was concluded by the new Jura-Simplon company to put on a larger number for further observation. As a result the installation grew to be probably the largest of any now in Europe. It extends in all to about 50 passenger cars of all classes and to about half a dozen baggage cars. A number of additional cars are now being fitted up so that shortly, it is expected, there will be 120 electrically lighted cars having from 600 to 700 lights in use.

The accumulator outfit of each car of the Huber system, made by the "Société Suisse pour la Construction d'Accumulateurs Electriques," of Marly-le Grand, weighs altogether 110 kg. (about 242 lbs.). It is compact and arranged in a movable box which can be readily lifted into and out of a car by two men. Each battery consists of three hermetically closed ebonite boxes, securely fixed in the main enclosing box, which latter is fitted with a wooden cover as a further protective measure. Each ebonite box is again subdivided into three parts, and each of the latter contains a battery element or cell, there being thus nine cells, connected in series, with a pressure of 18 volts. The capacity of each battery is 120 ampère hours. Three-watt lights are employed (equal to 18 volts × 0.17 ampère), making an available lighting duration for each fully charged battery of from 700 to 750 candle hours. The candle power of the lights in the two-axle cars of all kinds varies from 30 to 55 candles, and in the three-axle first class cars amounts to 70 candles. The latter cars are provided with two batteries each, and the former with one battery, and the lighting capacity for the passenger cars thus extends over from 10 to 15 hours, and for the baggage cars over a still longer period, 20 hours and more, even when all the lamps are in constant use. The lamps are fixed to the car roofs.

The spent batteries are taken in special cars from the several principal stations to Fribourg where they are recharged and returned to their proper destinations.

The Stewart Avenue Interlocking.

A contract was signed on Jan. 9 between Mr. E. H. Goodman, President and General Manager of the Union Switch and Signal Co., and the Chicago, Madison & Northern Railroad to put in at Stewart avenue crossing the Westinghouse electro-pneumatic interlocking system. The Chicago, Madison & Northern has made arrangements with the Chicago & Alton, the Pittsburgh, Fort Wayne & Chicago, the Chicago & Western Indiana and its tenant lines, the Chicago & West Michigan, Chicago & Eastern Illinois, Chicago & Erie, Chicago & Indiana Coal Co., Chicago & Grand Trunk, Louisville, New Albany & Chicago, the Wabash and the Atchison, Topeka & Santa Fe for the use by them of the interlocking system. Work on the material will begin at once at Swissvale. The tower and power house will stand at the crossing, although its exact position has not yet been decided upon. The power house will have an electric lighting plant, for lighting the crossing, and also for incandescent lights in the signal lamps. Near the Indiana elevator will stand a signal bridge with 12 signals, and between this and the crossing will be another bridge with 10 signals. The system will consist of 81 single switches, 22 slip switches and 84 signals. All approaches will be connected with the tower by a telephone and annunciator system, by which those in charge of the apparatus may know of the movement of trains several miles distant from the crossing. Mr. E. L. Corthell and Mr. V. Spicer have had charge of the work for the Chicago, Madison & Northern Railroad. This remarkable crossing was shown in the *Railroad Gazette* some months ago.

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Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

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A year ago we reported 98,074 freight cars built by private works in 1890. Later figures brought the total up to 103,774 freight cars as the output of all works outside of railroad companies' shops. The returns received for 1891 now give 95,514 freight cars built by private works last year. From these figures the falling off appears to have been a little less than 8 per cent.; if full returns could be got this might be changed somewhat. The reports for each year are from 50 companies. Only 38 replied for both years, but the net decrease in the output of these 38 works is a trifle over 9 per cent. We are probably safe, therefore, in assuming that this represents fairly the relative work of the two years in building freight cars. The fluctuations in the business last year were unusual. Twenty-three of the firms which report in both years show a falling off of 34 per cent.; 10 of them show an increase of 45 per cent. Among these latter, naturally, the largest gains have been by firms which were just getting established in 1890, or which for some reason had reduced their output in that year much below the normal. The greatest decreases in 1891 were among some of the large works which are embarrassed, or, in one or two instances, works which, on account of the low prices prevailing, turned their plant to other products. The net increase in freight cars for several years has been, according to Poor's Manual, as follows:

1890	10,801	1886	40,395
1889	46,054	1885	7,120
1888	54,239	1884	19,736
1887	104,973	1883	48,212

Average for 8 years, 41,440.

The total freight cars in the United States at the end of 1890 was, by Poor, 1,061,970. It is quite impossible to make any close estimate of the number of those built in any one year which have gone to fill vacant numbers; but 1,100,000 is a convenient round number to remember and is probably not far from the total in service at the end of 1891.

President Depew's letter to the State Railroad Commissioners, giving the New York Central's plans for block signaling (published last week) contained one passage which provoked considerable comment, to wit: "Our officers believe that this system [The Westinghouse electro-pneumatic] used as an auxiliary with the Sykes block at stations only, would meet all the requirements between Buffalo and Albany." As Sykes locks would be of no benefit between stations A and C, if, in consequence of the existence of an automatic block signal at B, two trains were permitted to be between A and C at the same time, it was a conundrum what the officers of the road had in mind; but we understand that their real intention is to use man-operated signals, with electric interlocking, from station to station (the Sykes) on the two passenger tracks. *and nothing else*; and that the combination of Sykes (man-operated) and automatic signals is proposed for the two freight tracks only. As we have heretofore pointed out, the passenger trains between Albany and Buffalo are not so numerous but that they can be very conveniently blocked without the establishment of more than a very few additional telegraph stations. If four-mile block sections are established the trains can be run closer together than is now safe, and on a 300-mile run there is no need of short blocks for passenger trains except near the termini, in any event; that is, with any traffic now known. By the time the Central needs two-mile blocks on this part of the road it will doubtless be rich enough to afford operators and Sykes locks at every block if it wants them. The determination of the Central to block the freight tracks is highly commendable and shows that some at least of the managers appreciate the importance of this safeguard as a protection for employés and as a money saver, as well as for protecting passengers and appeasing public wrath. Blocks of the same length as those on the passenger tracks can be cheaply operated, as the freight tracks are close to the passenger tracks nearly all the way, and no additional operators, towers or telegraph poles will be needed. But when it comes to making shorter blocks on the freight tracks, and an automatic system is used for that purpose, the Sykes locks will, of course, become useless, as they are only a hindrance when two or more trains are between two Sykes-locked signals at the same time; and Mr. Depew's statement is therefore at variance with general signal practise after all. Most managers would say that ordinary unlocked block signals would be a reasonably adequate safeguard for freight traffic. A system that is good enough for the passenger trains of the Pennsylvania and which has been used for both passenger and freight trains on ten thousand miles of English roads for from 10 to 25 years, making a record whose safety is well known, would seem to be good enough for tracks devoted exclusively to freight trains. The very complete plant which the New York Central has ordered for the 21 miles north of Yonkers is described in another column of the *Railroad Gazette* to-day.

The Interstate Commission Statistics

The advance sheets of the report on the statistics of the railroads of the United States for the year ending with June, 1890, collected by the Statistician of the Interstate Commerce Commission, appear a year and a half after the expiration of that year, which will probably cause less attention to be paid to them than they deserve, notwithstanding their completeness, the evident care and intelligence with which they have been collected and some novel and interesting features.

The chief of these, the summarizing of the statistics for ten territorial groups, has been made familiar to us by the recently issued census bulletins for four of these groups, which bulletins, though they give comparatively few data, give them for ten successive years, and so afford opportunity for the comparisons which give statistics their chief value. The latest year covered by these bulletins, however, is 1889. To present properly the statistics of the new report requires, as it were, ten reports, one for each of the territorial groups, besides an eleventh to cover the total. Our readers, we are sure, will excuse us, therefore, if we make our account of the contents of this document very incomplete. It should be borne in mind that the statistical reports of the Interstate Commission and those of the Census Bureau are different things, prepared by different offices, though properly Prof. Henry C. Adams, the statistician of the Commission, also has charge of the census statistics of transportation, and they are therefore in many respects similar. The collection and compilation of the Commission statistics have been under the charge of Mr. James A. Case, while the Census statistics are collected by Mr. W. W. Mayberry.

The division of the railroads into groups (see p. 45 for a sketch map) is a desirable feature, but the groups vary in extent and still more in importance, and it is hard to understand why some of them should have been made as they are: but doubtless there would be strong objections to any other division, and the difficulty of obtaining data for parts of single railroad systems limits the practicability of some divisions which might otherwise be desirable. The least mileage in one group is 6,878, in New England; the largest 37,463, which extends from Indiana and the Great Lakes on the east to the line joined by the Missouri and the Mississippi above Cairo on the south and west, and to Canada on the north. The addition of the population and area of each of these groups would have added materially to their value and have been peculiarly appropriate for the census year.

The summary interrupts to such an extent the statistics of the whole railroad system by those for the ten groups that it is excessively difficult to ascertain from it a straightforward statement of the chief data for the whole country, and comparisons with the previous year have been in many cases neglected. We have in some tables below extricated some of these figures.

The statistician found a total of 163,597 miles of railroad in the United States at the end of June, 1890, which, we will add, is one mile for every 382 inhabitants found by the census that month; and this latter figure is, we think, one of the most significant in the entire railroad situation. The net addition to the railroad system during the year in question was 5,838 miles, 152 miles of road having been abandoned meanwhile. Official returns were had for only 156,404 miles of railroad, with 8,487 miles of second track, 761 of third track, 562 of fourth track, and 32,711 miles of sidings, yards, etc. This makes a total of 199,876 miles of track for the roads reporting, which the 7,193 miles of road not reporting, with their sidings, etc., is estimated to bring up to 208 612 miles, being the length of track to be maintained and important to bear in mind in estimating the demand for rails and ties. This mileage was owned by 1,797 different companies, but worked by only 881 companies. Forty companies worked 77,873 miles of road, or 47½ per cent. of the whole.

The property covered by the report is as follows:

	1890.	1889.
Miles of railroad	156,404	153,385
Number locomotives:		
Passenger	8,384	8,079
Freight	16,140	15,140
Switching	4,062	4,016
Unclassified	1,392	1,801
Total	29,928	29,036
No. passenger train cars	26,511	25,665
No. freight cars owned	913,580	854,031
No. of cars leased	131,721	134,309
No. cars in freight lines	59,740	49,766
Total freight cars	1,105,041	1,038,106
No. service cars	32,636	31,657

The number of cars leased does not separate freight from passenger cars, but doubtless the passenger cars are but an infinitesimal part of the whole. Per 100 miles of railroad there were in 1890, 19 locomotives, 17 passenger cars, 707 freight cars, and 21 service cars. There was an increase during the year of 3 per cent. in the stock of locomotives, 3½ per cent. in passenger-train cars, and 6.4 per cent. in freight cars.

The above property, together with the stocks and bonds owned by railroad companies, and their working capital, was represented by:

	1890.	1889.	Increase.
Common stock	$3,803,284,943	$3,677,266,136	$126,018,807
Preferred stock	606,373,542	573,924,583	32,448,959
Total stock	$4,409,658,485	$4,251,190,719	$158,467,766
Mortgage bonds	4,123,822,740	4,267,527,859	
Miscel. obligations	305,741,310		
Income bonds	76,933,818		
Equipment trust debt	49,478,215	54,328,164	
Total funded debt	$4,574,586,083	$4,321,856,023	$252,730,060
Other debt	453,108,804	442,128,632	10,980,172
Total capital	$9,437,353,372	$9,015,175,374	$422,177,998

These figures do not agree with those in the balance sheet given in the report, which is doubtless explainable; but the latter shows cash and current assets, supplies, etc., to the amount of $386,500,000, which lacks $67,600,000 of offsetting the unfunded debt above. More important than this, though, the companies reporting own $963,873,759 of the stock and $443,053,242 of the bonds of other companies, which must be deducted from the above to ascertain the amounts represented by the railroad and equipment, leaving $3,445,804,726 of stock and $3,680,769,498 of bonds for the 156,404 miles of railroad, or $22,032 of stock and $23,534 of bonds per mile. To this must be added the unfunded debt, $2,897 per mile, which, though perhaps equalled by the current assets, depends for income on the earnings of the roads, the supplies and current accounts receivable not returning a direct income. A very large part of the unfunded debt—the current liabilities—however, does not bear interest any more than the current assets. But including the whole, we have a total capital of only $48,463 per mile. The custom of including the stocks and bonds owned by the railroad companies in the total capital represented by the railroad property has long exaggerated the average capital per mile.

The above table shows an increase of $158,468,000 in total capital stock during the year and of $252,730,060 in the funded debt; but the report shows an increase of $116,113,000 in the stocks and of $138,821,000 in the bonds owned by railroad companies, which would reduce the increase in stocks and bonds represented by the railroad companies to $56,264,000, while the report (table on page 48) says this increase was $179,968,304. There is, however, evidently a great error somewhere in this table, for the figures as they stand would show a *decrease* of $240,000,000 in the stock and bonds not owned by railroad companies, instead of the above increase. Comparison with the report for 1889 does not

enable us to correct this error, though it shows that more than $381,000,000 has been omitted from the figures for the bonds in 1890.

The work done by the United States railroad system reporting was:

Train miles:	1890.	1889.	Inc.	Per cent.
Passenger	285,575,804	277,240,804	8,335,000	3.0
Freight	435,170,812	383,200,573	51,970,239	13 5
No passengers	492,430,865	472,171,343	20,259,522	4.3
No. tons freight	636,541,617	539,639,583	96,902,034	18.0
Millions of:				
Passenger miles	11,843	11,554	294	2.5
Ton miles	76,207	68,727	7,480	10.9

The increase in passenger service and traffic was small, but as large as the rate of increase in the population. The increase in freight traffic was large, but there was a still larger increase in freight train mileage; the average freight train load having fallen from 179⅔ to 175½ tons. The average passenger train load fell from 42 to 41, which is an extremely small figure. The above traffic was equivalent to an average movement each way daily over the entire system of 156,404 miles of:

	1890.	1889
Passenger trains	2.50	2.48
Freight trains	3.67	3.42
Passengers	104	103
Tons freight	667	614

The average passenger journey was 24.47 miles in 1889 and 24.06 in 1890; the average distance freight was hauled *over any one line reporting* was 127.36 miles in 1889 and 119.72 in 1890. Such an enormous quantity of freight passes in single shipments over two or more roads that the statement of number of tons carried must be materially greater and that of average length of haul materially less than the truth.

The earnings of the railroad system from this traffic, its working expenses and its other income, and the disposition of the income were:

Earnings.	1890.	1889.	Increase.	P.c
Passenger	$260,787,453	$254,039,665	$6,746,788	2.7
Mail	23,367,873	21,923,631	1,444,842	6.6
Express	20,277,711	19,736,411	541,300	2.7
Other pass. train earnings	4,965,383	.....	.....	...
Freight	714,464,277	642,432,674	72,031,603	11.2
Other freight earn.	3,245,233	2,345,127	900,106	38.1
Other earn. from operation	24,302,398	19,576,653	4,725,745	24.1
Unclassified	468 304	397,784	70,520	17.7
Total	$1,051,877,632	$964,816,129	$87,061,503	9.0
Working expenses.	$692,093,971	$644,706,701	$47,387,270	7.3
Net earnings	$359,783,661	$320,109,428	$39,674,233	12.4
Other income	126,767,064	125,169,702	1,597,362	1.3
Total income	$486,550,725	$445,279,130	$41,271,595	9.3
Fixed charges and taxes	384,792,138	343,890,394	40,901,744	11.9
Net income	$101,758,587	$101,388,736	$369,851	0.4
Dividends	89,688,204	82,110,198	7,757,006	9.4
Surplus	$12,070,383	$19,278,538	Dec. $7,387,155	38.3

The increase of 9 per cent. in gross earnings is large, and that of 12.4 per cent. in net earnings notably so, as also that in fixed charges and taxes. The net income was almost the same in both years, but there was a large increase in the dividends paid, which shows in a reduction of the surplus from $19,000,000 to $12,000,000. The dividends paid were at the rate of 2.03 per cent. on all the stock outstanding, but no dividends were paid on $2,811,526,552 of stock, leaving an average of 5.62 per cent. on those shares which received anything.

The following is a summary of some of the principal results:

Per Mile:	1890.	1889.	Inc.
Gross earnings	$6,725	$6,290	$435
Working expenses	4.425	4,203	222
Net earnings	$2.300	$2.087	$213
Other income	811	816	Dec. 5
Total income	$3,111	$2,903	$208
Interest on debt, and taxes	2,460	2,242	218
Dividends	574	535	39
Surplus	77	126	Dec. 49

Per train mile:	1890.	1889.	1888.
Passenger, revenue	103.041 cts.	106.287 cts.	113.932 cts.
" cost	80.984 "	83.068 "	84.691 "
" net	27.057 "	23.219 "	29.261 "
Freight, revenue	165.434 "	165.377 "	165.712 "
" cost	105 711 "	106.481 "	103.876 "
" net	59.723 "	58.896 "	61.836 "
All trains, revenue	144 231 "	139.191 "	146.719 "
" " cost	96.606 "	94.858 "	96.050 "
" " net	48.225 "	44.323 "	50.669 "
Per cent of expenses	66.56 "	66.81 "	65.34 "
Per passenger mile, revenue	2.167 "	2.105 "	2.349 "
Per passenger mile, cost	1.917 "	1.903 "	2.042 "
Per passenger mile, net	0.250 "	0.172 "	0.307 "
Per ton mile, revenue	0.941 "	0.922 "	1.001 "
" " " cost	0.604 "	0.563 "	0.620 "
" " " net	0.337 "	0.329 "	0.371 "

There was an increase over 1889 of 7 per cent. in gross and 10 per cent. in net earnings per mile, which was a little more than absorbed by the increase in interest and taxes.

There was an increase of 2 per cent. in the average freight rate from that of 1889, which was 8 per cent. less than that of 1888. The passenger rate was very slightly greater than in 1889, but 12 per cent. less than in 1888.

The total number of railroad employés increased from 704,743 in 1889 to 749,301 in 1890, and from 4.59 to 4.79 per mile of road worked. Of the whole number 37.4 per cent. were engaged in "conducting transportation," 26 per cent. in maintenance of way and structures, 16.5 per cent. in maintenance of equipment, and 3 3 per cent. in general administration; the remainder, more than one-sixth of the whole, being unclassified. The average work done per employé amounted to 381 passenger train and 580 freight train miles, 15,800 passenger miles and 101,600 ton-miles. The latter figures will give an approximate idea of the extent to which man's labor has been made effective in transportation through the railroad.

The black spot in our railroad service is shown in the report on accidents. The casualties were:

	Employés.	Passengers.	Tresspassers.	Others not tresspassers.	Total.
Killed	2,451	286	3,062	500	6,335
Injured	22,396	2,425	3,042	1,131	29,027

Only the greatest battles show as many casualities as the total above. As we have often pointed out, the accidents to passengers, which alone attract much public attention, are an almost insignificant fraction of the whole number. These include, of course, all persons injured on the tracks as well as victims of accidents to trains, the latter being but a small part of the whole. The number of employés killed and injured is appalling. The statistican finds that one in every 306 was killed, and one in every 38 injured, while among trainmen one out of 105 was killed, and every twelfth man was injured! No less than 369 men were killed and 7,473 injured in coupling cars, while 561 were killed and 1,802 injured by falling from trains or engines.

The report gives the number of locomotives and cars equipped with train brakes as follows:

	1890.	1889.	Increase.	P.c.
Locomotives	20,102	17,935	2,167	12 0
Passenger cars	25,330	23,540	1,790	7.6
Freight and service cars	102,911	86,624	16,287	19.0

Little more than one-twel fth of the freight stock is equipped with these brakes. Of 148,892 pieces of rolling stock equipped with power brakes, 143,661 had the Westinghouse.

Automatic couplers were attached to 115,819 pieces of rolling stock in 1890, against 80,510 in 1889, and the number having each of 44 different kinds is given. There is much else that deserves attention in the report and will doubtless receive it hereafter, statistics of this kind affording data for the discussion of many railroad questions.

The Counselman Case.

Last Monday the Supreme Court of the United States handed down a decision which has been awaited with a great deal of interest since 1890. Important rights of railroads as well as of private individuals were involved, and the decision has naturally attracted widespread attention. A great many loose statements of what was decided in this case have been made, and the press has been flooded with predictions of results to flow from this decision, of which most are exaggerated and inconsequent.

The facts are as follows: In 1890 the grand jury of the United States District Court for Illinois was investigating certain alleged violations of the Interstate Commerce Act by the Rock Island, the Burlington and the Chicago, St. Paul & Kansas City railroad companies. Mr. Counselman was asked whether he had obtained from railroads coming to Chicago from points outside the state a rate for grain transportation less than the tariff rates, and rebates, drawbacks or commissions. These questions he declined to answer on the ground that his answer might tend to criminate him. His refusal was brought to the attention of the Court and by the usual proceedings he was, when still refusing to answer, adjudged guilty of contempt of court, fined, and committed to the Marshal to be held until he should have answered the questions The propriety of this disposition of the matter was brought up by *habeas corpus* for review before Judge Gresham, who upheld the commitment for contumacy, and from his decision the case went to the United States Supreme Court.

The sole question, therefore, for this tribunal to determine was: Did Mr. Counselman enjoy immunity from the questions asked him by the grand jury, and did he properly refuse to answer them?

It seems to have been conceded on the part of the Government that the questions asked, if answered in the affirmative, would have criminated Mr. Counselman, and that under the constitution he would have been protected, had not an Act of Congress, which is substantially and especially re enacted in the Interstate Commerce Act, rendered such inquisition harmless by providing that such answers should not be used against the party on the trial of any criminal proceedings or for the enforcement of any penalty or forfeiture. Mr. Counselman assailed the constitutionality of this Act of Congress, and thus the issue between him and the Government rested on a question of law, to be determined by the Court.

The Federal Constitution provides that no person shall be compelled in any criminal case to be a witness against himself. The Court holds that the Act of Congress alluded to (section 860 of the Revised Statutes) was opposed to this constitutional provision, and was accordingly void; that while Mr. Counselman's answers might not have been used against him, yet his examination might have disclosed the existence of other means of proving his guilt, the use of which was not forbidden by the act in question, and thus, by his own testimony, he may have furnished, indirectly, evidence against himself. The Court, however, holds that such an Act would not have been unconstitutional, had it provided absolute immunity to the witness against future prosecution for the offense to which the questions related.

The effect of the decision upon the Interstate Commerce Act is thus to declare invalid so much of that Act as provides that any officer or agent of a railroad company may be compelled to furnish testimony, oral or documentary, which may tend directly or indirectly to convict him of an unlawful offense. But the Court intimates very clearly that the constitutional objection to this portion of the Act may be removed by providing as an amendment that such officer or agent shall be absolved from criminal responsibility for the offenses which he is thus made to disclose.

The question seems never to have been before the Interstate Commerce Commissioners, but the paramount authority of the Supreme Court binds the Commissioners and relieves them from any further examination of the question.

It is not, however, to be inferred, nor has the Court decided that the clause referred to in the Interstate Commerce Act is inoperative for all purposes. A witness may still be examined under this clause to establish an offense for which he is in no degree himself responsible.

Commissioners' Decision on the Hastings Collision.

The telegraphic summary of the New York Railroad Commissioners' decision on the Hastings collision, which is printed in another column, does not indicate that they have discovered any facts not heretofore published, except in relation to the Sing Sing collision, which occasioned that at Hastings. For this, they blame the engineman, who "backed his train on the main track." As this is a piece of misconduct for which the conductor is equally responsible with the engineman, and of a kind which he is generally more blamable for, it would be interesting to know why they censure only one.

The censure of the dispatcher and station master at New York is based on a radical misconception of the true way of giving trains the right to the road (protecting them from collision), as we remarked in discussing the verdict of the coroner's jury. It is perhaps well enough for these men to be reminded of the great responsibility resting upon them to do all their duties with the utmost promptness, but there is no reasonable theory by which they can be directly blamed for the collision. Suppose the engineman of the St. Louis express *had* been notified at New York that there was a blockade at Dobbs Ferry; would that have justified him in slackening speed at Hastings, when the fixed signal showed clear? Or in losing time all the way from Hastings to Dobbs Ferry? Such dependence upon enginemen to use their own judgment in deciding by rule of thumb where to maintain full speed and where not to is just the kind of practice that causes collisions instead of preventing them. On this theory the express runner ought to have begun to "be on the lookout" (which, if it means anything in the Commissioners' report, means run slowly) some miles below Hastings, for, could he not reasonably assume that a few long freight trains had got caught behind the passenger trains?

The censure of Delanoy is more reasonable, as a flagman who wishes to stop a train ought to take advantage of any fixed signals he may find available. We do not know the practice of the New York Central, but it is common knowledge that the work of selling tickets and checking baggage has come in many places to be so entirely separated from all work connected with the movement of trains that station agents at small stations, whose work is practically nothing but selling tickets, often have little skill and less experience in doing anything with switches or signals. A man of this sort could not be expected to take any intelligent interest in a brakeman's doings. As the officers of the road, who have talked freely, have said nothing about blaming Delanoy, it is to be assumed that the rules did not place any responsibility on him in a case like this. Even if

they did it is hard to see how that could mitigate the brakeman's fault. Station and train men will assume all sorts of things, and it is hard to stop them; but if Delaney was ever justified in assuming anything, he was justified in assuming that Herrick; if he had any flagging to do, had left his lantern where the runner could see it and a torpedo where he could hear it.

The commissioners virtually sustain the directors in waiting until warned by numerous collisions on their own road before adopting the block system, and thus are consistent with their own assumption in 1889 that evidence of the suitableness and necessity of the block system was not procurable; though they do say that in that year they recommended the establishment of the system between Yonkers and Croton.

Mineral Statistics of 1891.

The issue of the *Engineering and Mining Journal* of Jan. 2 is its "annual statistical number" and is devoted to the mineral statistics of 1891. It has 78 pages and contains articles by specialists on the various minerals produced in commercial quantities and on the mineral industries of various regions and countries. The great staples of the United States, coal, iron and steel, gold, silver, copper and lead, are treated editorially and by specialists and local correspondents. Tables are given of the monthly prices of mining stocks in the great markets. The number is admirably indexed and is thus made the more available for frequent reference.

Though the cash value of the mineral products of the United States for the last year will probably be less than in 1890 ($650,000,000), yet the quantities produced were, with very few exceptions, much greater than in any previous year. The output of gold has probably increased by 312,000 oz. to 1,620,000 oz., valued at $33,250,000, and the silver production is estimated at 58,000,000 oz., or $74,820,000.

The production of anthracite coal amounted to 42,839,779 tons of 2,240 lbs., an increase of some 7 million tons over the preceding year; the production of bituminous was about 98 million tons. The prices were somewhat lower than in 1890.

The iron industry was, as everybody knows, much depressed all the year, and the make of pig iron declined from 10,307,028 tons of 2,000 lbs., to 8,976,000. This decline is attributed principally to the limited make of steel rails, which fell from 2,095,996 tons of 2,240 lbs. in 1890, to 1,000,000 in 1891. The Steel Rail Association contrived nevertheless to keep the price at $30 at the mills and $30.80 at tidewater. It is suggested that the object in maintaining this hard-and-fast price has been to a certain extent defeated in that the railroads have been kept from buying; but it is questionable if they would have been large purchasers even at a considerably less price; for, after all, the actual want of money must have been the controlling element in the situation.

The production of copper was materially increased, reaching nearly 299 million pounds, of which 73 per cent. was consumed in the United States. The production of Lake copper was nearly 16 million pounds greater than in 1890. Comparative figures for other mineral products are given in the following table:

MINERAL PRODUCTION OF THE UNITED STATES IN 1890 AND 1891.

	1890.	1891.
Gold, oz.	1,588,889	1,620,000
Silver, oz.	54,500,000	58,000,000
Pig Iron, tons of 2,000 lbs.	10,307,028	8,976,000
Steel Rails, tons of 2,240 lbs.	2,095,996	1,090,000
Copper, lbs.	264,920,000	298,620,000
Lead, tons of 2,000 lbs.	181,494	205,488
Zinc, tons of 2,000 lbs.	66,242	76,500
Nickel, lbs.	200,332	144,841
Quicksilver, flasks.	22,976	21,022
Aluminum, lbs.	94,881	163,820
Tin, lbs.		123,366
Antimony Ore, tons of 2,240 lbs.		700
Anthracite Coal, tons of 2,240 lbs.	38,656,483	42,839,799
Bituminous Coal, tons of 2,240 lbs.	93,000,000	98,000,000
Phosphate Rock, tons of 2,000 lbs.	637,000	679,731
Salt, bbls. of 280 lbs.	9,727,697	10,229,694
Bromine, lbs.	510,000	415,000
Pyrites, tons of 2,650 lbs.	109,431	122,438
Sulphur, tons of 2,000 lbs.		1,200

It will be noticed that, while nearly all the items show a decidedly increased production, three minerals are reported for the first time, viz., tin, sulphur and antimony ore.

The *Journal* takes occasion to point out "the absurdity of our barbarous system of weights and measures," in which it finds for example tons of 2,240, 2,204½ and 2,000 pounds, and regrets that all the world does not use a single metric standard of weights and measures. We quite agree that such a reform would be a great comfort, but we suggest some inconsistencies in the practice of the *Journal*. For example, why should the pig iron statistics be reported in tons of 2,000 pounds when the article itself is bought and sold by tons of 2,240 pounds? In fact the estimates of furnace capacities are based on the latter unit. Further, it does not seem necessary to make a table of the world's product of pig iron in metric tons of 2,204½ for English readers when that same table shows that the people who read that language produce 63.6 per cent. of the world's pig iron and sell it in tons of 2,240 pounds.

The Hall Signal Co., which for some time has announced in its advertisements that it was prepared to make rail circuit as well as wire circuit block signals, seems to have entered into the new line of work quite extensively, and we understand that the signals (13 block sections) in use on the New York Central between Oscawana and Peekskill, N. Y. (described in the *Railroad Gazette* Dec. 5, 1890), and which have hitherto been worked by means of wires upon poles, are now connected with rail circuits, and the wires abandoned. The New York Central officers, like most others ordering Hall signals, evidently regard the protection of trains which have broken in two as an important feature in an automatic signal, as it does not appear but that the wire circuit signals have continued their excellent record reported in the above-mentioned description. But the desire to be always able to safely practice permissive blocking is doubtless a chief motive for setting aside wire circuit signals, for a wire circuit signal that can be operated so as to make a record which is reasonably clear from unnecessary stops possesses, for absolute blocking, certain advantages over rail circuit systems. In fact, a prominent Western road which has now used the Hall wire circuit signals on several miles of road for over a year, has records of operation showing fewer unnecessary stops than we have ever seen in a rail circuit record, and that road still prefers the wire circuit. The Hall company has made another change which is of considerable interest, and is indeed radical when looked at from an operating standpoint, and that is the arrangement of the electrical connections so that the signals stand normally at danger instead of at "all clear." Under ordinary automatic signal systems, as is well known, an engineman who goes over a piece of the road which has been unoccupied for, say, six hours understands that the signals which he finds "all clear" have been in that position for that length of time; and the possibility that a signal may from some cause be stuck in that position, and thus be unreliable, of course disturbs him the more as the time that has elapsed since the last preceding train is greater; and the clockwork signals, the most familiar automatic signals in this country, are therefore generally arranged to move from clear to danger just before the engineman reaches them, so that he may be assured that they are not frozen up or rusted, or otherwise out of order. The arrangement now adopted with the Hall signal secures this means of reassuring the enginemen without the disadvantage of throwing a signal to danger immediately in front of him. The manufacturers do not describe their apparatus, but the principle is simple. The signal circuits, instead of holding a *signal* at "all clear," hold the connections of a local circuit in such a position that *it* is *ready* to clear the signal as soon as an approaching engine, by means of a track instrument or a rail-circuit, closes it. The only apparent objection to this arrangement is the additional number of wires, electro-magnets and track levers or complications of track circuits, and the cost and care incident to these; but it is said that the complication is not great, and the New York Central's officers speak well of the signals arranged in this way. These Hall signals are also arranged with two discs, one on each end of the arm attached to the revolving armature. The cloth disc is used only for a day signal, while the other, made of red glass, swings to and from a lamp placed back of a separate opening in the case, above that used for the day signal. The glass makes a better red night signal than the cloth.

A recent press dispatch from Minneapolis said: "There is no longer serious doubt that the Canadian Pacific means to desert Manitoba and Ontario and run its trains through North Dakota, Minnesota and Wisconsin. There will be a continuous track from Vancouver on the Pacific Coast by the way of Regina, Valley City, Minneapolis and Sault Ste. Marie to Halifax on the Atlantic Coast. The Canadian Pacific abandons the line through Ontario along the northern shore of Superior, chiefly because the immense amount of snow in that region has frequently caused a tie-up over the entire transcontinental line." A letter from a high officer of the Company contains the following, which will probably be a disappointment to the ardent Minneapolis reporter: "The Soo Line is being extended northwesterly via Valley City, N. Dak., with a view to an ultimate connection with the Canadian Pacific, near Regina. The story about the abandonment of the Lake Superior section of the Canadian Pacific is an old and silly one. The Company is steadily at work in improving this section—is expending millions in masonry and steel structures, and in other permanent work, with a view of making it equal to any line in America. There is no trouble from snow, and no difficulty of any kind in working it."

The strike on the San Antonio & Aransas Pass proved to be a stubborn one and, so far as we can learn, the traffic of the road is still very irregular. This is a long road (600 miles altogether), but its traffic is very light, so that the disturbance of business is not so great as in most strikes extending over such a large extent of territory; moreover the important towns have other outlets. But yet the delays to mails and to large live stock shipments have been very serious, and the money losses of numerous country people, whose grievance is an important one, but who do not growl so loudly as people in New York or Chicago, must aggregate a large sum. The Receivers in charge of the road seem to have determined at the outset to secure new men and to have been enabled to do so, even at the expense of a week or a fortnight's suspension of business; by the circumstances we have indicated.

From a French railroad officer there comes a complaint that will remind many readers of old times. He thinks that the exaggerated feeling of security created among train hands and engineers by the use of the Westinghouse brake has led to reckless carelessness, and has developed a tendency to ignore even the commonest precautionary measures. To this is largely ascribed the recent frequency of grade crossing accidents on some of the French lines. There are men still in active service in the United States who fought the Westinghouse brake with this argument, and there are those who still use it against block signals. So there are Englishmen who hold that engine cabs make runners comfortable and careless. But the world moves in spite of those who sit back in the breeching and say it does not.

The United States District Attorney at Topeka, Kan., has filed a bill in equity in the United States Circuit Court at that city asking for the dissolution of the Trans-Missouri Freight and Passenger Association, the action being brought by order of the Attorney-General of the United States, under the Sherman anti-trust law, passed by Congress July 2, 1890. The fifteen different roads composing the association are made defendants severally, and the allegation is that the association, being a combination to prevent competition, is prohibited by the law. Several interviews are published, but no one seems to know why this action is taken at this time nor why the Trans-Missouri was the association selected.

The Southern Pacific Company is making a series of locomotive tests on the run between Oakland Pier and Sacramento, 84 miles, with the following engines: A 20 and 27 x 24 in., ten-wheel, Schenectady compound with 69 in. wheels; an eight-wheel, single expansion engine, 18 x 24 in. cylinders, but in other respects similar to the compound; also a Baldwin, ten-wheel compound, with 11½ and 19 x 24 in. cylinders, built for the Los Angeles Terminal. The Baldwin engine has 56-in. wheels and is much lighter than the other engines. The simple expansion engine was built by the Cooke Locomotive Co. in 1888, and weighs, in working order, 95,800 lbs., with 61,350 lbs. on the driving wheels, and 34,450 lbs. on the trucks. The engine has four driving wheels 62 in. in diameter. The high cost of fuel on this road offers the possibility of a large saving by the use of compound locomotives, and it is to this end that the experiments are being made.

NEW PUBLICATIONS.

Proceedings, Engineers' Club, of Philadelphia, October, 1891.—The railroad subjects claiming attention in this number are those of "Rapid Transit in Cities," and "Rail Joints." Professor H. W. Spangler opens the discussion by a general review of the subject, referring particularly to what is actually done in Philadelphia in this line, and is followed by Mr. G. Herbert Condict, who devotes himself to the subject of electric railroads, with special reference to the storage battery system, and by Mr. T. Carpenter Smith, who takes a conservative view of the future of the electric railroad. The discussion is continued by Mr. P. G. Salom, who, like Mr. Condict, advocates the storage battery, and by Messrs. H. B. Seaman and John C. Trautwine, Jr., who discussed the relations of rapid transit systems to the public in general.

Under rail joints four new forms were submitted, two by Mr. Chas. S. Churchill, of Roanoke, Va., and one each by Mr. Geo. W. Creighton, of Sunbury, Pa., and Mr. J. Bernard Walker, of Corvallis, Ore. In discussing these designs, the Publication Committee, in its editorial capacity, calls attention to their similarity in this respect, that each of them proposes a rigid support under the base of the rail. In Mr. Churchill's two designs the joint is a bridge joint, the supporting members resting upon the two joint ties, while Mr. Creighton's and Mr. Walker's joints are strictly of the suspended pattern, the supporting part being placed between the two joint ties and supported by the flanges of the rails themselves.

The journal contains a number of other interesting papers, and under the head of "Reference Book," a table of equivalents of cubic yards and cubic feet.

Master Car and Locomotive Painters' Association—Proceedings of the 22d Annual Convention, September, 1891.

The proceedings of this Convention appear in a thin, cloth-bound volume, convenient and durable. The gist of the proceedings has already appeared in our columns, although there is a good deal of discussion of special interest. The Secretary has gone to the labor of putting in marginal titles, which will be of great convenience to anybody wishing to use the volume. The Secretary is Robert McKeon, Kent, O.

The Engineering Magazine, January 1892.—The first article in this journal is Worthless Government Engineering, by Mr. George Y. Wisner. It is very short, being only about seven pages, but its piquancy is in inverse ratio to its length. It is a severe arraignment of the Engineer Corps, U. S. A. Mr. Wisner has had a large experience under army engineers and on work parallel with theirs, and he writes with knowledge—possibly with prejudice. Mr. Coleman Sellers continues his papers on American Supremacy in Mechanics, and there are other articles of importance.

Charles Scribner's Sons have issued an Index to *Scribner's Magazine*, Volumes I to X, to include December, 1891. This will make available some rather valuable transportation and technical literature, such as the railroad articles, the steamship articles and the electrical articles. The Index is bound separately in a thin volume of 90 pages, uniform in size and style with the *Magazine*.

TRADE CATALOGUES.

Second Catalogue of the Weir Frog Co., Cincinnati, O., 1892.—The catalogue of 1891 was the first that this company ever issued, notwithstanding its long career and extensive business. This one, like the first, shows a great variety of frogs, switches, crossings and other track material, for railroads and street railroads. Among the new devices shown is a combination crossing with widened gauge for curved tracks, and reenforced switch rails. A new split switch, with adjustable head-rod and reenforced rail is also shown. The reenforcement is by wrought iron plates riveted to the sides of the web, and the adjustment by which lost motion due to wear and spread of gauge is taken up appears to be very efficient. There are a number of useful tables appended to the catalogue.

What is Electricity?

The average man will be glad to know that such an authority as Prof. William Crookes, President of the Institution of Electrical Engineers, England, is yet in doubt as to the various theories advanced to explain the electric phenomena. He says: "We know little as yet concerning the mighty agency of electricity." In his recent presidential address there is much of interest to the engineer, and we quote the following:

"We have happily outgrown the preposterous notion that research in any department of science is mere waste of time. It is now generally admitted that pure science, irrespective of practical applications, benefits both the investigator himself and greatly enriches the community. 'It blesseth him that gives and him that takes.' Between the frog's leg quivering on Galvani's work table and the successful telegraph or telephone there exists a direct affiliation. Without the one we could not have the other.

"We know little as yet concerning the mighty agency of electricity. 'Substantialists' tell us it is a kind of matter. Others view it, not as matter, but as a form of energy. Others, again, reject both these views. Prof. Lodge considers it 'a form or rather a mode of manifestation, of the ether.' Prof. Nikola Tesla demurs to the view of Prof. Lodge, but thinks that 'nothing stands in the way of our calling electricity ether associated with matter, or bound ether.' High authorities cannot even yet agree whether we have one electricity or two opposite electricities. The only way to tackle the difficulty is to persevere in experiment and observation. If we never learn what electricity is, if, like life or like matter, it should remain an unknown quantity, we shall assuredly discover more about its attributes and its functions.

"Experimentalists are reducing the wave lengths of the electrical rays. With every diminution in size of the apparatus the wave lengths get shorter, and could we construct Leyden jars of molecular dimensions the rays might fall within the narrow limits of visibility. We do not yet know how the molecule could be got to act as a Leyden jar, yet it is not improbable that the discontinuous phosphorescent light emitted from certain of the rare earths, when excited by a high tension current in a high vacuum is really an artificial production of these electrical rays, sufficiently short to affect our organs of sight. If such a light could be produced more easily and more regularly, it would be far more economical than light from a flame or from the arc, as very little of the energy in play is expended in the form of heat rays. Of such production of light nature supplies us with examples in the glow worms and the fireflies. Their light, though sufficiently energetic to be seen at a considerable distance, is accompanied by no liberation of heat capable of detection by our most delicate instruments.

"Alternating currents have at the best a rather doubtful reputation, but it follows from Tesla's researches that as the rapidity of the alternation increases they become not more dangerous, but less so. It further appears that a true flame can now be produced without chemical aid—a flame which yields light and heat without the consumption of material and without any chemical process. To this end we require improved methods for producing excessively frequent alternations and enormous potentials. Shall we be able to obtain these by tapping the ether? If so, we may view the prospective exhaustion of our coal fields with indifference. We shall at once solve the smoke question, and thus dissolve all possible coal rings. . . . Electricity seems destined to annex the whole field not merely of optics, but probably also of thermotics. . . . Rays of light will not pass through a wall, nor, as we know only too well, through a dense fog. But electrical rays of a foot or two wave length of which we have spoken will easily pierce such mediums, which for them will be transparent."

Flexible Metallic Tubing.

Rather more than two years ago we described a very ingenious system of flexible metallic tubing which we had then inspected, and had seen satisfactorily tested under various pressures. [Illustrated in the *Railroad Gazette*, Nov. 15, 1889.] This tubing was made from long strips of corrugated metal, wound spirally, the corrugations interlocking; the tightness of the tubing being obtained by the insertion of a strip of india rubber in the interlocking corrugations. For numerous purposes this tubing was found to answer admirably; but in many cases, as, for instance, the conveying of petroleum and other oils, steam at high pressures, chemical products, gases, etc., experience showed that the rubber deteriorated. It was seen that to remedy this defect, a different system of manufacture must be adopted by the Flexible Metallic Tubing Co., who own the patents for the invention. The problem was how to dispense with the rubber packing, and thus render the tubing metallic throughout. This problem has been satisfactorily solved, and it is interesting to know that engineers and others can now obtain a flexible metallic tubing of a permanent character, and unaffected by the passage of liquids, steam or gases. The tubes are made from strips of metal of the required length, breadth and thickness. The strip is fed into a machine in which it is first corrugated longitudinally with a wide and a narrow corrugation, the two running side by side. The strip is carried forward and is coiled spirally around a mandril in such a way that the smaller corrugation interlocks with the larger one, forming a piston joint. Sufficient spring is left on the tube to cause a perfectly tight joint to be formed, but not enough to give any outward circumferential strain. An important feature of this tubing is that while resisting very high pressures it is also tight at low pressures. As regards its resistance, we may mention that we saw a 35 ft. length of 1-in. tubing (internal diameter) subjected to a steam pressure of 50 lb. per sq. in. This tube was afterward tested by hydraulic pressure to 800 lbs. per sq. in. A length of ½ in. internal diameter tubing was submitted to hydraulic pressure, and stood over 1 ton per sq. in. before giving out. The sizes at present made by the company range from $\frac{5}{16}$-in. to 3-in. in diameter, but they are now laying down plant for the manufacture of tubes up to 12-in. diameter. The uses to which this tubing can be put are very numerous. Among others is that of carrying petroleum gas used in lighting railway carriages, for which purpose one of our railway companies recently required it. This gas is conveyed from a reservoir to the carriages at a pressure of about 150 lbs. per sq. in. Trials made with the tubing up to the present for this puspose are stated to have been very satisfactory. For steam the tubing was used at the Royal Naval Exhibition at varying pressures up to 200 lbs. per sq. in. It has also been employed for pumping petroleum from barges, and in fact for nearly all purposes for which rubber hose is used.—*Industries.*

Territorial Grouping of Railroad Statistics.

The sketch map shows the territorial grouping of railroads adopted by the Statistician of the Interstate Commerce Commissioner in his report for 1890, advance

Territorial Grouping of Railroads.

Statistical Report of the Interstate Commerce Commission.

sheets of which have just been distributed. Concerning this the report says:

The assignment of railway statistics to territorial groups is a matter of such importance as to warrant a word of explanation. The chief service of statistics is to disclose what is typical respecting the facts investigated, but in order to obtain a type of which practical use may be made, it is necessary that the data compiled should be fairly congruous in character. This means that a rational classificatiou of data must precede its compilation. The most simple principle of classification for the present investigation is the one which divides railways according to the territory through which they run, since in this manner density of population, the topography of the country, and the character of the industry served by the railways may be taken into account. . . .

There were two other considerations which influenced somewhat the grouping adopted. Thus, the character of the competition to which railways are subjected was held in mind, although in a railway system which permits, for example, the Michigan Central Railroad Company to compete for freight between New York City and New Orleans, or the Missouri Pacific Railway Company to compete for freight from Chicago to St. Augustine, it must be admitted that classification according to the competitive forces to which roads are subjected is a difficult matter. The truth is that so far as competition is concerned the railways of the United States are wholly devoid of system, and it was therefore impossible to permit this consideration to influence their territorial grouping to any great degree. The other consideration referred to led to the adoption of boundary lines which conformed as nearly as possible to the established lines of railways, since in this manner the data recorded would be actual facts taken from the books of the company, and not loose estimates. It was this consideration which led to the abandonment of State lines as section boundaries.

The number of railway companies carrying on operations within two or more of the territorial groups adopted is 42. In the case of 17 of these companies, the form in which their accounts are kept is such that no information supplemental to that which they were accustomed to file was necessary. Of the remainder, 16 filed "Supplemental," or territorial reports, in addition to the reports covering the entire system, and in the case of nine roads the assignment of data has been made in this office. The rules adopted for making this assignment are too complicated to be given in full, but in order to show that the figures in this report are not arbitrary, the principle underlying these rules may be submitted. With the exception of a few items, for the division of which information contained in the consolidated report was a safe guide, all data were assigned in proportion to the averages discovered by compiling the returns for the respective groups which needed no assignment. For example, it was assumed that that portion of the Wabash Railroad lying in Group VI. is allied in character to the other railways of Group VI., and that that portion lying in Group III. conformed in general to the character of roads in Group III. The result of such an assignment is doubtless less reliable than an assignment by the officers of the several roads, and it is desired in future to rely altogether upon "Supplemental Reports" from railways; but it will certainly be admitted that the results attained are better than if statistics of operation had been assigned arbitrarily on a mileage basis.

On Calculating Helical Springs.

BY A. L. DE LEEUW.

The well known formulas used for calculating the dimensions of helical springs are:

$$P = \frac{S\pi}{16} \times \frac{D^3}{R} \text{ and } \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

$$F = \frac{32}{\pi} \times \frac{P\,R\,L}{G\,D^4} \text{ in which} \ldots\ldots\ldots\ldots (2)$$

P is the maximum load.

S is the allowable stress.

D is the diameter of the wire.

R is the radius of the coil from centre of coil to centre of wire.

F is the deflection or difference between the heights when free and when solid.

L is the length of the wire when straight.

G is $\frac{2}{5}$ of the modulus of elasticity.

Further shall H indicate the solid height and P_1 the load when the spring has a certain height between free and solid.

To use formula (2) it is necessary to know the values of L and P. This latter value may be found by applying formula (1), while the former, L, is easily found by using the following formula:

$$L = \frac{2\pi R H}{D} \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

So far there is no difficulty at all in determining dimensions of a spring; but this matter becomes more troublesome if it is impossible to fulfill the conditions by using only *one* spring. It is, for instance, in most cases, impossible to exceed a certain outside diameter and also to exceed a certain thickness of the wire. In this case it is impossible to exceed a certain load, and if the maximum value of P (which can be reached by taking a maximum value for D and a minimum value of R) is still below the required capacity, then it becomes necessary to put a second coil inside the first one, and, perhaps, a third coil inside the second.

p, f, s, d, r, l, g, h and p_1 shall indicate the values for the second coil, corresponding to P, F, S, D, R, L, G, H and P_1 for the first one.

It will readily be seen that $h = H, f = F, s = S, g = G$.

In case of using two coils the lengths of the wires should be the same, and in that case

$$\frac{R}{D} = \frac{r}{d} \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

i. e., the radii of both coils should be proportional with the thicknesses of the wires, which then requires that the loads for both springs are proportional to the squares of the diameters of the wires.

It should be borne in mind that these laws are true only when the free heights and the solid heights are the same for both springs, and when the springs are made of the same material.

The following example may show the practical application of the above mentioned formulas and rules.

To find the dimensions and the capacity of a double helical spring, of which the following is given. (See fig. 1.)

Outside diameter = 8 in.

Solid height = 5½ in.
First coil to be made of 1⅛-in. steel wire.
S = 80,000 lbs. G = 12,600,000.
Clearance between the two coils $\frac{1}{16}$ in. at each side.
The spring should be 7⅛ in. high when being used.

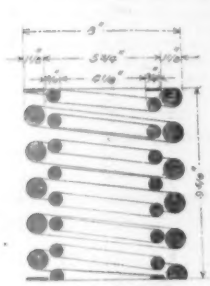

Fig. 1.

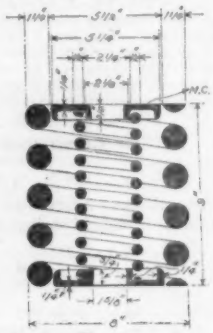

Fig. 2.

Solution.—According to formula (1)
P = 6,506 lbs.
According to formula (3) L = 10⅝ in.
According to formula (2) F = 4⅛ in.
Hence, the free height = 5½ in. + 4⅛ in. = 9⅝ in.
The deflection of the spring, when being used = 9⅝ in. − 7⅛ in. = 2½ in.
The load when 7⅛ in. high = 3,943 lbs.
The outside diameter of second coil = 5¾ in. − ⅛ in. = 5⅝ in.

According to (9) $r = \frac{55}{18} d$. $2r + d = 5\frac{5}{8}$ in.; hence, d = ¾ in.

Now, $P : p = D^3 : d^3$; hence, p = 2,915 lbs. The load of the second coil when 7⅛ in. high = 1,767 lbs. The total capacity of both coils, when solid, $P + p$ = 6,506 + 2,915 lbs. = 9,421 lbs., and the capacity when 7⅛ in. high = 3,942 + 1,767 lbs. = 5,710 lbs.

Another question is the increasing of the capacity of a certain existing spring to a given capacity by putting a second coil inside the given spring.

Given, for instance, a spring made of 1¼-in. steel wire, 5¾ in. high, when solid; 8 in. outside diameter, and which should have a capacity of 5,650 lbs. when 7½ in. high.

By application of formulas (1), (2) and (3) we find the load P = 9,090 lbs., and the deflection F = 3¼ in. Hence the free height = 9 in. The deflection, when working, = 9 in. − 7½ in. = 1½ in., from which follows the load at 7½ in. high = $\frac{1\frac{1}{2}}{3\frac{1}{4}} \times 9{,}090$ lbs. = 4,195 lbs. The carrying capacity should be 5,650 lbs., hence the carrying capacity of the spring, which is to be added, should be 5,650 lbs. − 4,195 lbs. = 1,455 lbs., when working, or 3,152 lbs. as a maximum load. According to formula (1) $\frac{d^3}{r} = \frac{788}{3{,}927}$. In the given spring $R = \frac{8 \text{ in.} - 2 \times 1\frac{1}{4}}{2} = 3\frac{5}{8}$ in. and $R : D = r : d$, hence $r : d = 27 : 10$. From these last two equations we have d = ¾ in. and r = 2 in. The outside diameter of the second spring = 4½ in. and the inside diameter of the first coil = 5½ in., which gives too much room between the coils.

This leads to the introduction of a plate on top and at the bottom of the second coil, serving to prevent the second coil from shaking, as shown in fig. 2. But in so doing we do not give to the two springs the same free and solid heights, hence we have a problem like this: Given the same outside coil as in the foregoing problem, it is required to increase the carrying capacity, when 7¼ in. high, to 5,650 lbs. The load when 7¼ in. high = 4,895 lbs. Hence the capacity of the second spring when being used = 5,650 − 4,895 lbs. = 755 lbs. The free height of the inside coil = 9 in. − 2 × ¼ in. (¼ in. being the thickness of the plates) = 8½ in. and the solid height = h = 5¾ in. − 2 × ¼ in. = 5¼ in. The deflection is the same as for the outside coil, being 3¼ in. The total capacity of the second spring is therefore = 1,402 lbs. The method for calculating d and r used in the last problem cannot be followed here on account of the formula (9) not being correct, the conditions not being the same in regard to the heights. The following method leads quite as surely, though not as quickly, to the required result.

Substituting the value of L in (3) into the equation (2) we have $f = \frac{64\, pr^3\, h}{gd^5}$, from which may be found $\frac{r^3}{d^3} = \frac{121{,}875}{1{,}402}$. From equation (1) one finds $\frac{d^3}{r^3} = \frac{1{,}402}{15{,}708}$. From these d = 0.49861 in. = 0.5 in. It will easily be seen that herewith the problem is solved in so far as we know the thickness of the wire, the radius of the coil and by applying formula (3) we get the length of the wire.

NOTE.—The second and third problems are taken from practice. This will explain why in the last case a pair of washers had to be introduced. The spring seats existed already and the object was to strengthen the old spring, using as well the old spring as the old spring seats.

ALTOONA, Pa., Nov. 24, 1891.

TECHNICAL.

Manufacturing and Business.

The Baker Heater Co. has sold its business to William C. Baker, and all business will hereafter be transacted in his name. The change has been made to avoid the confusion arising from similarity in names of competing heating companies.

The Automotic Interchangeable Car Coupling Co., which controls the California car coupler, during 1891 equipped 3,700 cars with its coupler. A number of the couplers are being used on several of the larger Eastern roads.

The padding for car seats and backs, made by the Knitted Mattress Co., of Canton Junction, Mass., is in use on about 50 passenger cars on the Delaware, Lackawanna & Western. It has been used on the cars of that road for five years. J. W. Baker, of Dover, N. J., Master Car Builder, writes that he considers the knitted mattress "equally as good, and in some respects better, than curled hair, just as durable, and it gives a saving of about $30 to each car."

Thomas H. Stryker and Edward Comstock, of Rome, N. Y., have been appointed Receivers for the New York Locomotive Works.

Julius Elson, Treasurer of the Jonson Foundry & Machine Co., at the foot of East 118th street, New York City, has been appointed Receiver on the application of Julius Jonson, the President. The nominal assets are reported to be about $75,000, while the liabilities are about $50,000. The company was principally owned by Messrs. Jonson and Elson.

Messrs. Hansen & Smith, Wilmington, N. C., call attention to a recent product used for wood preservation, called "spirittine oil." It is applied with an ordinary brush, dries quickly, and does not interfere with painting or varnishing. It is said to be adapted to preserving timber used for all sorts of purposes, and is thought by that firm to be the best and cheapest process of wood preservation that they have offered. It is already in use by several railroads and ship building establishments.

Mr. S. W. McMunn has retired from the firm of Coolbaugh, McMunn & Pomeroy, and will represent Messrs. Carnegie, Phipps & Co. as special railroad agent. The firm of which he has been a member has heretofore had this agency. Mr. McMunn's headquarters will be in Pittsburgh.

George Place, of 120 Broadway, New York, has now in stock a fine lot of new and second-hand machinery for railroad work. Mr. Place offers to exchange tools in shops for new or larger tools made by Bement, Miles & Co. and J. A. Fay & Co., for whom he acts as agent, or for new machinery of other standard make. He has engine lathes of numerous styles, and varying in sizes from 12-in. swing and 6-ft. bed to a lathe with a 20-in. swing and 8-ft. bed. There are in stock planers of nearly all sizes and styles, and numerous drills, shapers and slotters, boring machines and other tools. A special list has been printed which will be sent on application.

The American Railway Equipment Co., of New York and Chicago, has elected the following directors: O. S. Burr, A. S. Hatch, H. H. Crary, Herbert S. Ogden, O. S. Stearns, Hon. William Fullerton and Charles N. Walsh. Officers elected are O. S. Burr, President; H. H. Crary, Vice-President; A. S. Hatch, Treasurer; Henry D. Hobson, Secretary.

Several unsecured creditors of the United States Rolling Stock Co. began proceedings in the United States Court at Chicago last week for the removal of A. Hegewisch, the Receiver. His appointment as receiver is void, it is declared, because of the lack of jurisdiction of the court which made it.

Byram & Co., of Detroit, manufacturers of the Colliau cupola furnace, have recently shipped to the Leland Stanford, Jr., University, Palo Alto, Cal., one of their cupola furnaces, together with other foundry supplies.

Shop and Station Notes.

The officers of the Baltimore & Ohio and the Monongahela River Road are considering the sites offered for the new joint station at Fairmount, W. Va., and will decide in a few days. Plans have already been prepared for the structure. The building will be three stories high and will be occupied by both roads as a passenger station and for offices. The joint yards of the companies are also to be enlarged.

Car Heating.

The following paragraph appeared in this column January 8: "By permission, the Consolidated Co. also announces that the Wagner Palace Car Co. has adopted the improved Commingler (McElroy) system as well as the Sewall Coupler. This statement is now denied by the officers of the Wagner company.

Air Brake Prices.

The Westinghouse Air Brake Co. has issued a revised schedule of prices for engine, tender and freight car equipment. The new prices are as follows: Engine $250, tender $40, freight cars $40. The former prices were $275, $60, and $45 respectively. These prices go into effect after Jan. 1, 1892.

The Hopkins Tunnel.

The Hopkins Gap tunnel on the main line of the West Virginia & Pittsburgh Railroad has been opened. The tunnel is 724 ft. long, and pierces the divide between the Elk and Little Kanawha rivers between Burnsville and Braxton, W. Va. The tunnel is cut at a seven and a half degree curve, and at a grade of 53.7 ft. to the mile. It has a semicircular heading 23 ft. in diameter, with a rectangular bench 23 ft. wide and 13 ft. high. The work was done by T. J. Stears & Co. Eleven thousand loads of rock were excavated, and 300,000 ft. of timber were used in the lining. The ends of the tunnel for 50 ft. each way will be arched with heavy solid stone masonry.

Minneapolis, St. Paul & Buffalo Steamship Co.

This company, which will operate in connection with the Minneapolis, St. Paul & Sault Ste. Marie ("Soo" Line), has been incorporated by Thomas Lowry, R. B. Langdon, F. D. Underwood, W. D. Washburn, John Martin, C. E. Wales and John S. Pillsbury. Two steamships are now being built for the company by the American Steel Barge Co., of West Superior, Wis. These ships are "whalebacks," and the first ones of that type built with decks. They will be the heaviest carriers on the great lakes for their draft, carrying 3,800 tons and drawing 16 ft. of water. The vessels will be equipped with triple expansion engines and will have a guaranteed speed of 14 miles an hour. They will run between Gladstone, Mich., and Buffalo, Erie and Fairport. The headquarters of the steamship company are at Minneapolis, Minn.

The Main Drainage Scheme at Chicago.

For a year or more progress on this work has been stopped through influences in the Board of Trustees, but at the last election a change in the personnel of the Board was made, and an Engineering Commission, with Trustee L. E. Coohy at its head, was appointed to make a report, which has been published in full in the Chicago papers. This report recommends an energetic effort to secure the actual beginning of the work on a plan that will permit the flow of sufficient water to properly dilute the sewage of Chicago, afford a navigable channel for lake vessels and conserve the water power which will be developed in the valley of the Illinois River by the large flow and considerable fall. There are 10 miles of continuous rock work between Sag and Lockport. It is estimated that the excavation of this rock will require four years, and the rockwork on the five miles from Sag to Willow Springs will require nearly an equal time. The work on the 14 miles between Willow Springs and Chicago, mostly, if not entirely earth, can be completed in two years, as can the work below Lockport. The widening of the Chicago River can be prosecuted with more leisure. It is urged that the work between Sag and Lockport should be begun within six months.

Technical History.

In *The Engineer* (London), of Jan. 1 appears the first of a series of articles on the Construction of the Modern Locomotive, written by Mr. G. Hughes, Assistant Mechanical Engineer to Mr. Aspinall, Locomotive Superintendent of the Lancashire & Yorkshire Railway. It is said that the articles will describe every detail in the process of constructing a locomotive as practiced at the Horwich shops. Those of our readers who have visited these shops know that they are among the most modern and best equipped locomotive shops in the world.

Engineering (London) begins in its issue of Jan. 1 a Short History of Bridge Building, by Mr. C. R. Manners. The first chapter is devoted to suspension bridges, which are not illustrated in any detail, general or pictorial elevations only being given.

The Mississippi-Superior Canal.

The proposed canal connecting the Mississippi River with the great lakes recalls the fact that a preliminary survey was made for the state of Minnesota, $3,000 having been appropriated for that purpose in 1875. This reconnaissance showed the most feasible route to be by way of the St. Croix River, from its mouth to a point near to the headwaters of the Brulé River, the course of which would be followed to Lake Superior. The distance by that route would be about 150 miles and in order to pass boats drawing 15 ft. of water 13 or 14 locks would be required. The estimated cost is between $8,000,000 and $10,000,000.

Shipbuilding at Superior.

Seaboard says that the demand for building berths at the West Superior yard is so great that two of the new boats will be launched at a very early date. The six berths will all be reoccupied by spring and the indications are that a third set of boats will be contracted for. Two of the new boats to be completed before spring are steamers 324 ft. long, 42-ft. beam and 25 ft. depth, and the preliminary work for laying the keel of the 500-ft. passenger whaleback is about completed. There is also a promise of some work for salt water. A line of passenger steamers, to run from Superior and Duluth to Buffalo at the rate of 16 miles an hour, has been projected, and it is said will be accomplished.

Steam Traction for Street Car Lines.

Economic traction on tramways is the subject of a note in a recent issue of *Le Génie Civil* in which attention is directed to the Rowan type of steam motor, now in constant daily use on the tramway line between Auteuil and Boulogne, France. A number of illustrations are given of the cars as there equipped. It may be briefly said that in the Rowan system the motor is placed directly on the car, forming part of it. Part of the weight of the car is thus made available for increasing the adhesion, an important feature in street car work, where the rails are frequently very muddy and slippery. The car rests on two trucks, the forward one being a 4-wheel truck, carrying the boiler and motor, and the rear truck having two wheels only, on one fixed axle. A feature of the whole arrangement is that the forward truck, with the motor and boiler, may be separated from the car proper in a few minutes and another one substituted, so that the necessity of repairs or cleaning of the motor outfit does not entail the temporary loss

of the use of the car. The Rowan outfit is made in several designs to meet the various traffic requirements, one of them being of the ordinary locomotive type, for use on light grade lines, while another provides for the use of a special type of vertical boiler; for use on specially heavy grades.

Cork Lagging.

In an article on the utilization of cork waste, resulting from the cutting up of cork for various purposes, the *Rigasche Industrie Zeitung* says that one very good use for such waste has been found in the manufacture of non-conducting coverings for steam pipes, boilers, etc. The pieces of cork are reduced to the form of a rather coarse powder in special machines, and this is afterward mixed with a shellac solution and pressed into any desired shape. Similarly prepared cork sheets are said to do good service in covering the walls and ceilings of cold storage-rooms, ice cellars, etc., the cork covering in such cases serving to keep out heat. As a non-conductor of sound the cork preparation is also well recommended.

THE SCRAP HEAP.

Notes.

The repair shops of the Louisville & Nashville Railroad at Decatur, Ala., were destroyed by fire on Friday night, loss $40,000. Fifteen cars were also burned.

A press dispatch says that about 50 messengers of the Southern Express Co., running on the Louisville & Nashville, struck on Jan. 9, in sympathy with the strikers running on the Illinois Central. It is since reported that the men all returned to work.

The New York State Railroad Commissioners have approved an application for interlocking signals at the crossing of the Newburg, Dutchess & Connecticut railroad with the new Dutchess County Railroad.

A Chicago dispatch announces that the National Stock Yards, at East St. Louis, the principal stockholders of which are now railroad capitalists of New York and other Eastern cities, have been sold to Chicago packers, the chief of whom is Nelson Morris. It is stated that the transaction is to be consummated at a meeting to be held Jan. 21, in St. Louis.

The Railroad Commissioners of Georgia have issued an order limiting the rates for telegrams in that state to 25 and 2 for day messages and 25 and 1 for night messages, "no additional charge to be made for repeating messages." It does not appear whether this last unreasonable regulation applies to night messages only, or to both day and night. The order is to go into effect Feb. 1. Telegraph offices where messages are received from the public must not be discontinued without consent of the Commission.

The enginemen and firemen of the Naugatuck, Northamption and Connecticut Valley divisions of the New York, New Haven & Hartford have secured an increase of pay, the new rates being for each 100 miles: Passenger engineers $3.50, and passenger firemen $1.75; freight engineers $4, and freight firemen $2. The men demanded certain additional pay in the way of overtime, which men on the main line have, and the newspapers tried to make out that a strike was imminent, Mr. Arthur and other chiefs being in New Haven. But the men on the main line had no grievances and did not see fit to join in a strike.

Foreign Notes.

While our Southern States are suffering from an overproduction of cotton, New South Wales appears to have overproduced sheep. Recent good seasons have caused such a number that it is feared that millions will die in the next drought. It is now proposed to send the surplus to England as frozen meat, taxing the sheep owners for the required subsidy.

A party of trained government surveyors has left Bombay for Zanzibar to map the boundary of the English and German possessions in East Africa.

The Roumanian railroad authorities are about to erect a tie-treating plant which is to have a minimum capacity of 200,000 ties per annum.

One of the German express trains running between Berlin and Frankfort-on-the-Main is to be fitted up with electric lights. Storage batteries are to be used, and there are to be two independent circuits for each set of lamps, so that in case of damage to one the cars will not be deprived of light. The storage batteries are to be of special construction, and each set is to have a capacity of 200 ampère-hours, and will supply four 8-candle power lights for a passenger compartment, and one 5-candle-power light for each toilet room. The batteries will weigh about 300 kilogrammes each (about 660 pounds), and will be placed underneath the car floor in such a manner as to permit their ready removal when necessary.

Switzerland this year took the initiatory step in a movement which was thought to be the beginning of a general control by the government of the railroad systems of the whole country. At a meeting held in June of the various canton councils the Swiss "Bundesrath" was authorized to enter into negotiations tending to the purchase by the government of the whole property of the Swiss Central Railroad; but in view of the opposition to the project which developed itself the question had to be submitted to the vote of the people. The results of this vote have just been made public, and show a decided popular sentiment against the purchase, only 130,000 votes, in round numbers, having been cast in its favor, while 300,000 were opposed to it. It now remains to be seen whether this not wholly unexpected turn of affairs is based on opposition to the principle of state ownership of railroads, or whether it simply implies disapproval of the method which was followed in this particular instance.

A regulation recently adopted by the authorities of Tyrol and Vorariberg, with reference to the overcrowding of railroad cars has a peculiar interest for New Yorkers. The cars on the local line between Innsbruck and Hall were specially complained of as being overcrowded, particularly on Sundays and other holidays. The cars have a seating capacity of 34, and, according to the regulations which already existed, more than this number of passengers is not to be admitted into one car. The new regulation now provides that as soon as the available seats in a car are occupied, a sign bearing the word "complet" is to be placed on each of the sides of the car, and the public is forbidden to enter any car so labelled. The conductors' orders in the matter are to be implicitly obeyed, and violations of the rule are to be punished by fines of from 1 to 100 fl. or by imprisonment of from 6 hours to 14 days.

Spanish American Notes.

South American railroad stocks have suffered a severer decline in the past year than had been anticipated, due in large part to the political troubles. The greatest lapses have occurred in Argentine among the guaranteed lines. For example, the Cordoba & Rosario six per cent. preferred stock dropped from 91 to 62½. Buenos Ayres & Pacific stock fell to 48 from 112 one year ago, the seven per cent debentures having receded also from 117 to 66. The best record of any is the Buenos Ayres Great Southern, a non-guaranteed road. This line has kept up the payment of eight per cent. dividends throughout the financial crisis. In Brazil the depression has been great, but less severe than in Argentine. Uruguay railroad stocks have taken a tumble owing to the government's proposal to reduce the guarantees, and to the financial scare resulting from the effort to convert the government five per cent. bonds into three per cents. Even Paraguay is in financial stress, as a result of which the usually profitable Paraguay Central Railroad has been affected, its stock dropping from 71 to 22½ in the course of the past year. We note with pleasure an advance in the Antofagasta & Bolivia common stock from 113 to 115, while the four per cent. debentures have also risen from 92 to 95. The outlook for peace in South America, with perhaps the exception of Argentine, is good, and we may anticipate an improvement in securities during 1892.

The Brazilian railroad between Curitiba to Lapa, in the State of Paraná, was opened to traffic on Nov. 18. The length of road is 102 kilometres.

The Rio Claro Ry. Co. has protested against the concession to Joao Carlos Leita Penteado for a road from Sao Paulo, Brazil, to northeastern Bolivia. There are already three routes projected with a view to tapping Bolivia from Rio de Janeiro. The Brazilians are evidently awaking to a realization of their commercial opportunities.

The Corcovado Railway Co., of Rio de Janeiro, proposes to make an exhibit of its railroad in miniature at the Chicago World's Fair. The mountain of Corcovado, with the railroad as in operation, will be molded in papier maché.

It is stated that the mines of coal recently discovered at Las Heras in the state of Mendoza, in the Argentine Republic, will produce an excellent quality of steam coal, sufficient for the entire necessities of the country. A contract has also already been entered into with the railroad to Mendoza to supply it with all the coal required for its locomotives.

The great damage recently done to the bridges and permanent way of the Costa Rica Railway was not due simply to excessive floods, but to the bursting of a dam at Cartago.

It is of importance with reference to the future railroad development of Colombia and Ecuador that these two governments have concluded a treaty providing that traffic across the frontier between their respective territories shall henceforward be free of all customs restrictions. The commerce between the plateau of Quito and the rich valley of the Cauca, in Colombia, is already a large one, and this new arrangement will increase it considerably. This ought to encourage the road now being built by Mr. Cherry, an American, from Buenaventura, on the Pacific, to Cali and Popayán, in the south of Colombia.

Some of the English journals are greatly distressed because the "Yankees" are gaining every possible advantage in trade with Venezuela, whereas British interests are suffering, and the Venezuelan government is shirking its obligations toward British investments in railroads, harbor works, and the like. Some of our English cousins naively suggest that it might be expedient to "patch up" the British Guiana-Venezuelan boundary dispute, although they cannot see why "misunderstandings between the governments should affect injuriously the British companies who have invested their capital in Venezuela!"

Freight Rates a Century Ago.

In a "Retrospect, 1791 to 1891" presented by the late Hon. John Blair Linn to the Alumni Association of Franklin and Marshall College, the following freight rates are noted: In 1784 it cost $249 to carry a ton from Philadelphia to Erie by pack horses, no wagon road having been built. In 1789 it cost $3 a hundred, and it took a month to carry merchandise from Hagerstown, Md., over the Allegheny Mountains to Brownsville, Pa; and in 1793 it cost $75 a ton to carry bars of iron from Centre County to Pittsburgh. As late as 1817 it cost $140 to move a ton of freight from Philadelphia to Pittsburgh. In 1834 it took eight days for freight at a dollar a hundred to go from Philadelphia to Pittsburgh, and three days and 19 hours for passengers at $15 apiece. It was not until 1853 that the Pennsylvania Railroad completed its all-rail route between the two cities.

The Congo Railroad.

The first five miles of this road are completed; this covers about one-fifth of the difficult work, and it is hoped to have the road completed to Palabata on the summit of the plateau by the end of this year. From there to Kinchassa, on Stanley Pool, the work will be without difficulties due to the topography. About 2,750 native workmen are now employed on earthwork and rock excavation. The railroad company has had three iron buildings constructed for the use of missionaries, as the railroad officials say it will pay them to give this encouragement to the missionaries on account of the excellent influence they have upon the workmen and the solicitude with which they look after the health of the black personnel. The company has also taken steps to establish a sanitarium at Kinkanda, and has a competent medical staff to care for the sick.

A Blue Envelope Next.

The following is a specimen of the bulletin notices to be seen on the Fall Brook Coal Co.'s railroad: "A car of wheat was put into a train at Newberry and brought to Corning as an empty. The instructions require the conductors to look into every box car to see for certain that it is empty. This is a matter of record. If it happens again the services of the conductor will not be wanted any longer." No names are given on notices of this kind. The hint is generally sufficient.—*Buffalo paper.*

Strictly Local Railroads.

A Mississippi journal is advocating building dummy railroads on the plan of four radiating from each county seat, thus covering the state with a network of dummy roads, which, being of the standard gauge, would act as feeders to the railroads of the country. It is claimed that these roads would quadruple farm values, and by cheapening of distribution make "intensive" agriculture everywhere practicable. "A dummy engine," says the journal, "costs no more than a four-mule train and does the work of a thousand," which is what rhetoricians call hyperbole.

Lake Grain Demurrage Suits.

During the freight blockade in Buffalo harbor at the end of the season many boats were delayed by the inability of the elevators to handle their grain, and some claim to have lost a trip in consequence. The Wolf & Davidson Steamship Co. now brings a suit for $4,000 for demurrage and loss on account of two cargoes of grain shipped by the Minneapolis & Sault Ste. Marie Railroad Co. from Gladstone to Buffalo on a through rate to the seaboard, and consigned to elevators in Buffalo, which did not unload the cargoes promptly on arrival. This suit is brought against the railroad company instead of attaching the grain, which seems to be the natural course. Its result will be watched with great interest by both shippers and vesselmen.

Electric Street Railroad.

F. N. Fordyce, of Detroit, Mich., has formed a company to build an electric railroad from Huntington, W. Va., to Ashland, Ky. The road will be 16 miles long, and will pass through Huntington, Central City, Kellogg, Ceredo, Keneova, Catlettsburg and Ashland. The company has asked for a right of way through all these towns and from Cabell and Wayne counties, W. Va., and Boyd County, Ky. All these privileges have been granted except at Catlettsburg, where there is a difference as to the route to be followed. F. E. Stout is the company's attorney. The road will be arranged for carrying light freight as well as passengers.

State Railroad Commissioners on the Hastings Collision.

The New York State Railroad Commission reports the following conclusions and recommendations as the result of its investigation into the collision at Hastings on the New York Central & Hudson River road Dec. 24:

First—The Board finds that the immediate cause of the accident was criminal failure of Albert Herrick to signal the St. Louis express.

Second—That Augustus Ossman, Train Dispatcher, failed to exercise reasonable caution in not notifying Station Master Williams at the Grand Central Depot immediately that trains were held at Dobbs Ferry so that he (Williams) could notify engineers to be on the lookout.

Third—The Board finds that Station Master Williams failed to exercise reasonable caution in not notifying engineers of trains that trains were held at Dobbs Ferry after his notification of that fact by Ossman.

Fourth—The Board finds that Charles Delanoy, Station Agent at Hastings, was censurable for not inquiring of Herrick the cause of his (Herrick's) being at the station that he (Delanoy) could take precautions to warn trains.

Fifth—The Board finds that M. J. Murphy, engineer of the freight train which backed up the track near Sing Sing, causing the original blockade, was guilty of gross carelessness.

Sixth—The Board finds that in consequence of the largely increased number and speed of trains on the New York Central & Hudson River road, the "open road" system of operating is insufficient to secure the highest obtainable degree of safety, and approves of the determination of the company to equip tracks with the absolute block system, and also to interlock all switches on the main track with distant signals; and recommends that it prosecute work with the utmost dispatch.

Some of the papers print a long addendum to this, giving some additional points. Those which are of interest are given in the editorial column.

New Bessemer Ore Fields.

Just as the wonderful deposits of iron ore on the Gogebic range were becoming known in this country the President of the British Iron and Steel Association was prophesying a short life to the steel industry on account of our lack of suitable ores. No fear of that kind has lately agitated the breast of any one. In fact the Lake Superior ores probably present the most available deposits for Bessemer steel now known. And they seem likely to be reinforced by the deposits of the Mesabi range, north and northwest from Duluth. Explorations on this range are said to have developed large quantities of good Bessemer ore containing from 61 to 65 per cent. of iron, free from sulphur and silica and easily mined—not a hard ore like the vermillion near it, but so soft that much of it can be dug by a steam shovel. This deposit will, doubtless, make Duluth an ore shipping port, and it is possible that its shipments will enter into the account of this year, as there is talk of building a branch road from the Duluth & Iron Range Railroad at Mesabi Station, 10 miles to the Biwabik mine. A contract has also been let to Donald Grant, of Faribault, for building the Duluth, Mesabi & Northern road from a connection with the Duluth & Winnipeg, near Cloquet, to the range. This road will be 48 miles long to the Mountain iron mine and 64 to the Biwabik. It will have easy grades, and will be ready for handling ore by Aug. 1 next.

At quite the other end of the country, in Llano County, Tex., are large deposits of very good Bessemer ore, so available that they may aid to overcome the obstacles which Texans have placed in the way of further railroad building in their state.

LOCOMOTIVE BUILDING.

Ten new locomotives are in process of manufacture at the Canadian Locomotives Works, Kingston, Ont., for the Canadian Pacific Railway.

The Cooke Locomotive & Machine Co. is completing 10 engines with 18 × 24-in. cylinders for the International & Great Northern, which will be the finest 10-wheel locomotives built at these works.

CAR BUILDING.

The Baltimore & Ohio is asking bids for 1,900 cars.

The Boston & Albany is in the market for 550 cars.

The Duluth & Iron Range is about to place an order for 200 ore cars.

The Chicago & Northwestern has let a contract to the Pullman Car Co. for 120 passenger cars.

The George's Creek Coal & Iron Co. has placed an order with the South Baltimore Car Works for 100 new coal cars.

The Philadelphia & Reading order with the Pullman Co., noted several weeks ago, is for 100 passenger cars and 4,500 freight cars. The latter are divided as follows: 2,500 twin hopper gondola cars, 1,000 straight bottom gondola cars and 1,000 box cars.

The Southern Pacific in the year 1891 added 12 new engines and 700 box cars to its equipment, 500 of the cars being built at the company's shops in Sacramento. The company built no locomotives at its shops, as has been done in recent years, and only rebuilt one.

The new equipment to be ordered for the Cleveland, Cincinnati, Chicago & St. Louis will include, the General Manager says, 2,000 box cars and 500 box cars for the Peoria & Eastern, all to be of standard type, 34 ft. long, and of 30 tons capacity. Thirty passenger cars will be purchased.

The Ensign Car Works at Huntington, W. Va., which have not been in full operation for several months, are preparing to start up every department. Heavy consignments of material have been received within the past two weeks and the company has business booked to keep the plant in full operation for several months. Among the recent orders is one for freight cars from Central America.

BRIDGE BUILDING.

Cumberland, Md.—The stone work on the piers on the new bridge over the Potomac River at Cumberland, Md., was begun last Monday. There will be two abutments and two piers in the river, the piers each being 33 ft. long at the base and 6 ft. wide, and 40 and 60 ft. high, respectively. The stone is being taken from a quarry near Elgin, W. Va., and is the same as that used on the West Virginia Central bridge.

Duluth, Minn.—The Duluth Board of Public Works has awarded the $1,000 prize for plans for a bridge over the canal, to F. C. Ahrends, of Milwaukee. The plans to be used, however, are those of John A. Roebling Sons Co., of New York, which were considered the best, but were not eligible for the prize as they did not come within the terms of the competition.

Irvine, Ky.—Bennett H. Young, of Louisville, is the contractor for building a bridge across the Kentucky River at Irving for the Richmond, Nicholasville, Irvine & Beattyville Railroad. It is to be finished in 70 days, and will cost $61,000.

St. Paul, Minn.—The matter of changing the grade of Broadway preparatory to erecting the superstructure of the bridge across the Mississippi at the foot of that street renews the dispute between the Great Northern Ry. and the city. The railroad company claims absolute ownership of the property designated as Broadway from the south side of Third street to the tracks of the Union Depot Co. The piers have been built for nearly two years and the further progress of the work has since been delayed by the injunction obtained by the railroad company.

Wheeling, W. Va.—The Wheeling Bridge Co., which recently completed two very fine highway bridges over the Ohio River at Wheeling, W. Va., has appointed Mr. S. C. Dunlevy Superintendent. He has beuun negotiations to secure a right of way for another bridge to be built between Wheeling Island and Bridgeport. The company now has bridges connecting the city of Wheeling with Wheeling Island, with Ætnaville and with Martin's Ferry, and this bridge will almost complete its system. The company has prepared plans for a bridge to cross from hio street on Wheeling Island to Greenback street, Bridgeport, but it has been decided to abandon that plan; to have the bridge leave Delaware street on the island and cross to Pine street in Bridgeport, which is a continuation of the old National road running between Cumberland and St. Louis. Messrs. Paige, Carey & Co., contractors for building the Main Street bridge under the Wheeling Bridge Commission, have contracted with George L. Peabody, of Pittsburgh, to coat the upper surface of the arch stones and the tops of the abutments, leveled up for the spandrel walls, with Neufchatel asphalt. The original idea was to cover the tops of the abutments and the sheeting stones of the arch with Portland cement, but it was determined to put in the asphalt as well.

Yankton, S Dak.—It is reported that the Chicago & Northwestern will build a bridge across the Missouri river a few miles above Yankton. Senator Pettigrew has petitioned Congress for a franchise and it is understood that it is for the Chicago and Northwestern.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Maine the Supreme Court rules that a railroad charter may be considered as persumptively at its date without record evidence of the fact, when it appears that the grantees afterward asked for and obtained amendments to their charter and have fully constructed the road.[1]

A Connecticut statute provides that when a highway is laid out across a railroad the company shall bridge it, and half the expense of such crossing shall be borne by the company and the other half shall be paid to it by the town, city or borough constructing the highway. The Supreme Court holds that the charter of the company being subject to amendment, in estimating the damages to which the railroad company was entitled for the taking of its land for the highway the half of the expense of the crossing which the law imposed on the company could not be taken into account.[2]

In Georgia the Supreme Court rules that a charter of a railroad company, which authorizes it to construct its road between two given cities, and to connect with any other roads built into such cities, does not, by necessary implication, authorize the company to construct and operate its railroad longitudinally on the streets of such cities, in view of the law, which declares that public highways shall not be appropriated to railroads in the absence of express authority in their charter.[3]

In the Federal Court it is decided that a contract whereby a railroad company lets another company into joint possession of part of its line for 999 years, at an agreed rental, is not, as between the parties, *ultra vires*, where such joint possession does not interfere with the present use of such line by the company that owns it.[4]

In Minnesota the St. Paul Union Depot Co. was by its charter authorized to provide and maintain a union depot and tracks in the city of St. Paul, "open alike to all railroads now constructed, or which may hereafter be constructed, to or into St. Paul." The companies desiring to use the depot were to become stockholders. The law of 1879, accepted by the depot company, provided that any railroad company desiring to use its depot might subscribe to the capital stock of the depot company, and further declared that there should be no unjust discrimination against or in favor of any railroad company using or desiring to use the tracks and depot, but that the terms and conditions adopted for the same should be, as far as practicable, uniform, and apply alike to all railroads. Provision was made for apportioning the number of shares any railroad company desiring to use the depot should take, but no price to be paid therefor was named. The stock was only to be owned by the companies using the depot, and the only profit to be realized was from such tolls and rentals as they might pay in. Five railroad companies became stockholders, buying the stock at par, and afterward defendant railroad company, desiring to use the depot, sought to become a stockholder. The Supreme Court rules that defendant was entitled to its proportion of the stock at par, whatever might be its alleged value, and that, if all the stock was taken by the other companies, they might be compelled to surrender so much of their stock as might be necessary.[5]

In Connecticut the Supreme Court rules that a land owner, through whose premises a railroad right of way has been condemned, cannot require that a crossing be kept open over the track in order that he may have more convenient access to portions of his lands lying beyond it, though such crossing may not interfere with the use of the right of way for railroad purposes.[6]

Carriage of Goods and Injuries to Property.

In Tennessee the Supreme Court rules that where, in accordance with usage, a cotton compress company's receipt was delivered by the owner to a carrier, and a bill of lading issued by the latter, the liability of the carrier to the owner began, though the cotton was not yet actually delivered to the carrier.[7]

In Georgia, it is laid down by the Supreme Court that though goods saved by a railroad from the perils of a freshet were damaged by passing through the freshet without its fault, yet if some not saved are unaccounted for, and it is not shown that the freshet caused their loss, or what their condition was when they disappeared, a recovery for their full value may be had.[8]

The Supreme Court of Tennessee holds that a stipulation in a bill of lading, that the carrier shall not be liable for any cotton while in any compress, is not void, as being unreasonable. And so is a stipulation in a through bill of lading of non-liability for loss by fire throughout the whole distance, issued by a carrier having a line extending only part way to the destination, where it has a rate over its own line at which, if required, it assumes responsibility for such loss.[9]

In the same case it is held that a stipulation in a bill of lading, that the carrier shall not be liable for any cotton while in any compress, exempts such carrier from liability for loss occurring therein, although the compress company is the carrier's agent to receive the cotton; but, under such circumstances, a stipulation of exemption from liability for loss, while in any "depot" or "station," does not cover loss occurring in said compress.[10]

In Texas a railroad company owned land along a river and in its construction threw up an embankment. Afterward it laid the land out into town lots, and conveyed the same without reservation. During a freshet the embankment caused the land to be overflowed, whereby a stock of goods belonging to the vendee was destroyed. The Supreme Court holds that there was no implied right to flood the land, and the company's vendee might reasonably presume that it had so constructed its embankment as not to impede the natural flow of the water.[11]

In Tennessee a train loaded with cotton was delayed in a compress yard about half an hour later than its usual leaving time, during which it took fire from the compress. The Supreme Court rules that the failure of the train to depart on time was the proximate cause of the loss, and that the compress company was not liable.[12]

In New Hampshire in an action against a railroad company for injuries caused by plaintiff's horse being frightened by defendant's locomotive blowing off steam, the evidence showed that the horse was frightened by the escaping steam, that no notice was given of the approaching train by ringing the bell, and that the view of the train was obstructed by box cars, one of which was standing in the limits of the highway. The Supreme Court holds the railroad liable.[13]

In Georgia the Supreme Court holds that where a railroad erects an embankment for its track along the margin of a river, the accumulated waters of which, in times of flood, had previously escaped on that side, it being lower than the other, but which thereafter, and because of the embankment, overflowed the opposite side more than it had done before, the owner has a right of action against the company.[14]

In Texas it is ruled by the Supreme Court that it is not contributory negligence for the landowner to plant crops with knowledge that his land may possibly be overflowed if a railroad company does not make culverts in its embankment as required by statute.[15]

Injuries to Passengers, Employes and Strangers.

In the Federal Court it is held that where a railroad has advertised one rate for unlimited first class tickets between certain points and a less rate for limited first class tickets between such points, it may sell at the latter rate tickets which, though not limited as to time of use, do not entitle the holder to the right to stop over at intermediate stations, as is allowed under the unlimited tickets, since the requirement that the ticket shall be used only for a continuous passage renders it a "limited ticket."[16]

The Supreme Court of Texas rules that on the failure of passenger to remove his baggage from the depot, the railroad acquires the capacity of a warehouseman, and is liable only for lack of ordinary care; and where a passenger, on arrival at her destination, left her trunk, for convenience and economy, at the station, though with the agent's consent, but took a small portion of the contents thereof with her, the company's liability as carrier ceased, and that as warehouseman began.[17]

In Alabama, the Supreme Court rules that in an action for personal injuries, sustained by reason of the derailment of defendant's car, owing to the breaking of a rail, evidence that the cross-ties near the place of derailment were "unsound," "decayed," "rotten," and the rails old and defective ones, and that they were from time to time replaced by other old rails, warrants the finding of such gross negligence on defendant's part as will authorize an award of exemplary damages.[18]

In Virginia a train of six cars was being run along a coal wharf, upon a wooden structure 25 ft. high and about 300 ft. long. The only obstruction on the end of the structure was a log chained to the wharf. The chain gave way and let the cars pass over the end thereof, killing plaintiff's intestate, who was a brakeman. It further appeared that the company had ordered timbers four years before, intending to build a dead block, but the same was not built. The Supreme Court holds the railroad liable.[19]

In Maine the Supreme Court holds that where a train dispatcher habitually performs, in the name of the superintendent of a railroad, certain duties of the superintendent in his absence, with the assent of the corporation, any order to an employe from the train dispatcher, within the limit of his delegated authority, imposes upon both the corporation and employé the same duties and liabilities as if issued directly by the superintendent himself.[20]

In California the Supreme Court rules that in an action by a servant against the master for injuries caused by the breaking of a chain, it was error to refuse an instruction that the master was not an insurer of the servant, and was not bound to provide machinery or appliances which were absolutely safe; that he was bound to use only reasonable and ordinary skill and diligence in procuring safe machinery; and that the mere fact that an accident occurred did not raise the presumption that the master was at fault in providing such machinery or appliances.[21]

In North Dakota the Supreme Court rules that when an employé of a railroad company, riding by right on the platform of a caboose, with other employés, is by a lurch of the train pushed by them beyond the edge of the car and injured by striking a switch stand negligently placed too near the track, the position of the switch stand is the proximate cause of the injury; the push is not a sufficient intervening cause.[22]

In Texas the Supreme Court decides that in an action by a child against a railroad company for injuries received while playing on defendant's turntable it is proper, where the evidence warrants it, to instruct the jury that if defendant's turntable was located in a public place where children were likely to go, and where they were in the habit of going for the purpose of amusement, and if such turntable, when left unfastened and unguarded, was a dangerous piece of machinery, and if defendant's agents and servants knew, or by the use of reasonable diligence might have known, such facts, and if defendant's agents and servants left said turntable unfastened and unguarded, and if in so leaving the same they were guilty of that want of care which a reasonably prudent person would have exercised under the same circumstances to prevent injury, then they are guilty of negligence.[23]

In New Mexico in an action against a railroad company by one who was struck by a train while walking along the track, it appeared that plaintiff was familiar with the ground and knew that engines frequently passed over it at all hours; that he walked along the track for some distance without looking back, and that he could have seen and heard the approaching train if he had looked and listened. The Supreme Court rules that he was guilty of contributory negligence and could not recover.[24]

In South Carolina a statute requires railroads to ring a bell or sound a whistle at a distance of 500 yards from all public crossings. Section 1529 makes a corporation liable for injuries to persons resulting from collisions at such crossings for failure to give the signals, unless the person injured was guilty of gross negligence. The Supreme Court rules that one injured while standing in the switch yard of the railroad company, and not passing over a crossing, could not recover under the above statutes, though the yard was surrounded by streets and the required signals were not given by the company.[25]

[1] Farnsworth v. Lime Rock R. Co., 22 Atl. Rep., 373.
[2] N. Y. & N. E. R. Co. v. City of Waterbury, 22 Atl. Rep., 439.
[3] Davis v. E. T., V. & G. Ry. Co., 13 S. E. Rep., 567.
[4] C., R. I. & P. R. Co. v. U. P. R. Co., 47 Fed. Rep., 15.
[5] St. Paul U. D. Co. v. M. & N. W. R. Co., 49 Rep., N. W. 646.
[6] N. Y. & N. E. R. Co. v. Comstock, 22 Atl. Rep., 511.
[7] Deming v. Merchants' C. P. & S. Co., 17 S. W. Rep., 89.
[8] C., C. & A. R. Co. v. Wooten, 13 S. E. Rep., 593.
[9] Deming v. Merchants' C. P. & S. Co., 17 S. W. Rep., 89.
[10] Deming v. Merchants' C. P. & S. Co., 17 S. W. Rep., 89.
[11] Sellers v. Texas Cent. Ry. Co., 17 S. W. Rep., 32.
[12] Deming v. Merchants' C. P. & S. Co., 17 S. W. Rep., 89.
[13] Presley v. Grand Trunk R. C., 22 Atl. Rep., 554.
[14] O'Connell v. E. T., V. & G. Ry. Co., 13 S. E. Rep., 486.
[15] Clark v. Dyer, 16 S. W. Rep., 1,051.
[16] U. S. v. Egan, 47 Fed Rep., 112
[17] H. & S. A. Ry. Co. v. Smith, 17 S. W. Rep., 133.
[18] A., G. & S. R. Co. v. Hill, 9 South Rep., 722.
[19] N. & W. R. Co. v. Sliman, 13 S. E. Rep., 475.
[20] Lasky v. Canadian Pac. Ry. Co., 22 Atl. Rep., 367.
[21] Brymer v. Southern Pac. Co., 27 Pac. Rep., 371.
[22] Boss v. Northern Pac. R. Co., 49 N. W. Rep. 655.
[23] F. W. & D. C. Ry. Co. v. Robertson, 13 S. W. Rep., 1,093.
[24] Candelaria v. A., T. & S. F. R. Co., 27 Pac. Rep., 497.
[25] Hale v. C. & S. R. Co., 13 S. E. Rep., 537.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central Pacific, semi-annual, $1 per share, payable Feb. 1.

Chicago Junction Railways & Union Stock Yards Co., semi-annual, 3 per cent. on the preferred stock, payable Jan. 25.

Evansville & Terre Haute, quarterly, 2 per cent., payable Jan. 26.

Holyoke & Westfield, annual, 4 per cent.

Huntingdon & Broad Top Mountain Railroad & Coal Co., $1.75 per share on the preferred stock, and $1 per share on the capital stock, both payable Jan. 25.

Lehigh Valley, quarterly, 1¼ per cent., payable Jan. 15.

Little Schuylkill Navigation, Railroad & Coal Co., semi-annual, 3½ per cent., payable Jan. 11.

Long Island, quarterly, 1¾ per cent., payable Feb. 1.

Louisville & Nashville, semi-annual, 2½ per cent., payable Feb. 4.

Mahoning Coal, 5½ per cent., payable Feb. 1.

Mine Hill & Schuylkill Haven, $1.75 per share, payable Jan. 15.

Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent., payable Feb. 1.

Terre Haute & Indianapolis, semi-annual, 3 per cent., payable Feb. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Albemarle & Pantego, annual, Norfolk, Va., Jan. 18.

Arkansas & Louisiana, annual, Washington, Ark., Jan. 25.

Brooklyn Elevated, annual, adjourned, 31 Sands street, Brooklyn, N. Y., Feb. 20.

Chattanooga Union, annual, Georgia avenue, Chattanooga, Tenn., Jan. 21.

Dallas & Greenville, annual, Dallas, Tex., Jan. 19.

Dallas & Waco, annual, Dallas, Tex., Jan. 19.

Fort Wayne & Jackson, annual, Jackson, Mich., Jan. 25.
Houston, Central Arkansas & Northern, annual, Dermott, Ark., Jan. 18.
Keokuk & Western, annual, Keokuk, Ia., Feb. 3.
Lehigh Valley, annual, 228 South Third street, Philadelphia, Pa., Jan. 19.
New York, Ontario & Western, annual, 18 Exchange Place, New York City, Jan. 20.
Pittsburgh & Lake Erie, annual, 77 Fourth avenue, Pittsburgh, Pa., Jan. 26.
Pittsburgh, McKeesport & Youghiogheny, annual, Pittsburgh, Pa., Jan. 26.
Western & Atlantic, annual, Atlanta, Ga., Jan. 20.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New York Railroad Club* will hold its next meeting in the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, Jan. 21, commencing at 7:30 o'clock p. m.

The *Railway Freight Claim Association of the Eastern, Western and Southern States* will hold its regular semi-annual meeting at the Grand Pacific Hotel, Chicago, Ill., March 3.

The *New England Railroad Club* holds regular meetings, at the United State Hotel, Beach street, Boston, Mass., on the second Monday of each alternate month, commencing January.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *Southern Railway Club* holds regular meetings on the third Thursday of the months of January, February, March, May, September and November at such points as are selected at each meeting.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station, at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m. in the directors' room of the St. Paul Union Station.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesday in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1,122 Girard street, Philadelphia, on the first and third Saturday of each month. The annual meeting is held on the third Saturday in January. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursday at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

The *Canadian Society of Civil Engineers* holds regular meetings at its rooms, 112 Mansfield street, Montreal, P. Que., every alternate Thursday except during the months of June, July, August and September.

The *Association of Civil Engineers of Dallas* meets at 803 Commerce street, Dallas, Tex., on the first Friday of each month at 4 o'clock p. m.

The *Technical Society of the Pacific Coast* holds regular meetings at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., at 8 o'clock p. m. on the first Friday of each month.

The Tacoma Society of Civil Engineers and Architects holds regular meetings on the third Friday of each month, in its rooms, 201 and 202 Washington Building, Tacoma, Wash.

Canadian Society of Civil Engineers.

"Ship Transportation" and "The Chignecto Ship Railway" were titles of papers read before the Canadian Society of Civil Engineers week before last at Montreal by Mr. H. G. C. Ketchum, the engineer of the Chignecto Ship Railway. Mr. Ketchum spoke first on ship transportation, describing the transport system from the earliest period down to the present time. He thought that there was no necessity of deepening the existing Dominion canals at immense expense, as proposed, when, by using pontoons, ocean vessels might be conveyed at 20 ft. draft through the existing canals. All it required was a lift at each terminus at a convenient place where the water was deep enough for the purpose. The hydraulic lifts could also be utilized as graving docks for all sorts of lake craft. With proper precautions to preserve the pipes from frost as proposed at Amherst, N. S., there was no danger of damage from frost or ice. The system of pontoon floating might also be applied to the river shallows of the St. Lawrence in many places.

THE CHIGNECTO SHIP RAILWAY.

In his paper on the Chignecto Ship Railway, Mr. Ketchum spoke of the origin of the enterprise, and sketched its career down to the time when the work had to be stopped, owing to the failure to float the company's remaining bonds. Up to the time of the suspension the engineer's certificates for work done and materials furnished by the contractor amounted to £670,894 paid in cash, bonds and shares, and the engineering and administration expenses amounted to about £30,000, in addition. From a careful estimate made of the cost to finish the works, to equip with rolling stock, to provide interest on capital, to finance the remaining debentures and to provide for further engineering and administration expenses, it was calculated that fully $1,500,000 would be needed. The whole work might be said to be three-fourths complete, and it would take but one summer season's work to finish the ship railroad and docks fit for opening to the public. The costly work remaining to be done is the masonry and gate of the basin at the Bay of Fundy end of the line and the masonry of the two lifting docks. It is the only instance in the history of Canada where a wet dock and harbor basins and dredged entrance channels have been provided at the expense of a private company. The cost to the company of these entrance channels, docks, gates, sea-walls, basins and moles, will, when finished be about $1,000,000, exclusive of hydraulic lifts. The lecturer illustrated the work by stereopticon views.

Civil Engineers' Society of St. Paul.

The annual meeting was held Jan. 4. The following officers were elected for the year 1892: E. K. Woodman, President; J. D. Estabrook, Vice-President; C. L. Annan, Secretary; A. O. Powell, Treasurer; A. Münster, Librarian, and C. J. A. Morris, representative on the Board of Managers for the Association of Engineering Societies.

Southern & Southwestern Railroad Club.

The next meeting of the club will be held at the Kimball House, Atlanta, Ga., on Tuesday, Jan. 21, at 10 a. m. The subjects for discussion will be: (1.) "The most suitable type and mode of hanging inside brakes on car trucks." (2.) "The best practice of setting flues and proper treatment of same to prevent leaking." (3.) "The best sizes and shapes and modes of fastening draft timbers." Mr. W. H. Thomas, S. M. P., East Tennessee, Virginia & Georgia, and Mr. Pulaski Leeds, S. M. P., Louisville & Nashville, will report on repair work on large systems, and location of shop plants.

The Western Railway Club.

The club will hold its monthly meeting on Tuesday, Jan. 19, at 2 p. m. in its rooms, 850-854 Rookery Building, Chicago. The subject for discussion will be the paper on "Master Car Builders' Standards and Defect Cards," read by Mr. P. H. Peck at the November meeting. A paper on "Recent Improvements in American Railroad Rolling Stock" will be read by Mr. D. L. Barnes.

PERSONAL.

—Mr. J. D. McIlwain, in charge of the Grand Trunk car shops, London, Ont., for the past ten years, has received the appointment of Manager of the Harvey Steel Works, near Chicago.

—General Manager E. S. Bowen, of the Rome, Watertown & Ogdensburg has been granted a three months' leave of absence, and with his family will pass the winter in Southern California.

—Mr. C. H. Burtis, who for the past 10 years has been Claim Agent of the Rome, Watertown & Ogdensburg, has resigned, the department having been transferred to the General Counsel of the road.

—Mr. Frank G. Myers has tendered his resignation as Superintendent of Signals on the New York Central & Hudson River and on Feb. 1 will take a position with the Hall Signal Co., 50 Broadway, New York City.

—General George L. Becker has been reappointed a member of the Railroad and Warehouse Commission of Minnesota for a term of three years. General Becker is the senior Commissioner, the present being his third term.

—Col. George Leavitt, one of the originators of the Adirondack Railroad and one of its directors until its absorption by the Delaware & Hudson Canal Co., died of paralysis at his home at Friend's Lake, N. Y., last week.

—Mr. John E. Sanford, of Taunton, has been appointed by Governor Russell, of Massachusetts, to be Railroad Commissioner, in place of George G. Crocker, resigned. Mr. Sanford is a Republican, has been prominent many years in state affairs, and is at present a member of the Harbor Commission.

—Mr. George Maclaine, Assistant General Freight Agent of the Missouri Pacific, has resigned that position to take effect Feb. 1. Mr. Maclaine came to the Missouri Pacific from the Southwestern Railway & Steamship Association, and was formerly with Mr. J. Waldo in the Texas Traffic Association.

—Mr. Samuel B. Farnum died at his home in Port Jervis, N. Y., Jan. 10. He was 81 years old. He accumulated a large fortune as a canal and railroad contractor. One of his principal contracts was the building of a big section of the Delaware and Hudson Canal, at the completion of which he was appointed a division superintendent.

—Mr. A. M. Schoyer, for several years past Division Operator and Chief Train Dispatcher of the Pennsylvania Co.'s Eastern Division, has been appointed Superintendent of Telegraph of the Pennsylvania lines west of Pittsburgh, to succeed E. C. Bradley, who resigned to accept the position of General Manager of the Postal Telegraph Co.

—Mr. Nathan Foster, General Freight Accountant of the Boston & Albany, has resigned. Mr. Foster is a veteran in the service, having been with the road over 50 years. He was with the Western road before the consolidation, and went from Springfield to Boston two years ago, when the freight office was removed. He is nearly 80 years old and resigns on account of age and failing health.

—For the first time since 1887 it occurs that the management of the Philadelphia & Reading Railroad and the directors of the coal company are identical. The new member of the board, elected at the annual meeting of the railroad this week, is Mr. Samuel R. Shipley, President of the Provident Life Insurance Co., who succeeds the late Henry C. Gibson. Mr. Shipley is a former manager, who retired when the new party in Reading was given representation in the board.

—Mr. James W. Dodge, Superintendent of the Cheshire Division of the Fitchburg Railroad, has resigned that position, the resignation to take effect next month. Mr. Dodge has been connected with the Cheshire road more than 30 years. After a service as freight clerk and station agent at Keene, N. H., and clerk in the general freight office, he was appointed General Freight Agent in 1873. He became Division Superintendent of the Fitchburg, in charge of the road, a few years ago.

—Mr. John H. Inman was re-elected President of the Richmond & Danville at the annual meeting this week. Mr. Inman, replying to the request of the nominating committee that he accept the presidency again, said he would accept, and that he is in full accord with the efforts of the committee and security holders to place the company on a sound financial basis. He, however, expresses a desire to be relieved of the office at an early date, not later than when the committee's plan shall become operative.

—Chairman George G. Crocker, of the Massachusetts Railroad Commission, has resigned. It will be remembered that the Democratic governor appointed another man when Mr. Crocker's term expired last summer, but was checked by the Republican Council's refusal to confirm the appointment. Mr. Crocker has held over ever since, and probably resigns now out of a sense of propriety, as the Governor has been re-elected and has just entered upon his second term. We have heretofore had occasion to note the high value of Mr. Crocker's work on this board and his special fitness for the office. His retirement now is to be regretted, not only on these accounts but also by reason of his important place in the National Convention of Railroad Commissioners. Recent deaths and retirements have left our two best Commissions, the National and the Massachusetts, in a crippled condition, the remaining members being all inexperienced in the most difficult of the tasks demanding attention. Mr. Crocker had been in this office five years.

—The death of Mr. Edward Nichols, President of the Brooks Locomotive Works, which occurred at his home at Dunkirk, N. Y., early in the morning of Jan. 7, was the result of a cold contracted Dec. 31 last, which developed into pneumonia. His illness was immediately due to exposure at a fire at the locomotive works on the night of Dec. 31. Mr. Nichols' life had been a very honorable one, of great industry and much business success. Death came in the prime of his usefulness, Mr. Nichols being only 41 years old, and practically when he had only just begun his career. He was born in Vermont, but soon after his birth his parents removed to Tarrytown, N. Y., and after attendance at the town schools he entered Rensselaer Polytechnic School, at Troy, taking the Mining and Metallurgical course, and graduating in 1871. He occupied the chair of chemistry for the next year and a half, and had been assistant professor during part of his senior year. After traveling and studying in Europe in 1875 he returned in 1876 and was appointed Secretary of the Reception Committee of the American Society of Mining Engineers at the Centennial Exhibition. He then worked in the iron and steel plants at Bethlehem and Lewiston, Pa., for a short time, and from 1877 to 1879 was interested in Southern iron mining and took charge of a blast furnace at Hermitage in Northern Georgia. In 1884 he was married to a daughter of Mr. H. G. Brooks, of Dunkirk. In 1885 Mr. Nichols became Vice-President and General Manager of the Warren Scharf Asphalt Paving Co., of New York, with office in Cincinnati, O. In July, 1887, he was elected President of the Brooks Locomotive Works, after the death of Mr. H. G. Brooks. Mr. Brooks had long before expressed a wish that Mr. Nichols should succeed him in the management of the works, and some time before his death had urged him to accept a position in the works and assist him in their management.

ELECTIONS AND APPOINTMENTS.

Augusta & Savannah.—The following board of directors of the railroad was elected at Savannah this week: W. S. Lawton, President; A. R. Lawton, G. S. Owens, H. H. Hull, J. D. Weed, of Savannah; Frank H. Miller, of Augusta; W. W. Thomas, of Athens, Ga.

Baltimore & Cumberland.—The incorporators are David L. Bartlett, Bernard N. Baker, John A. Hambleton, Buchanan Schley, Henry G. Davis, H. Irvine Keyser and T. B. Davis, of West Virginia.

Boston & Albany.—Nathan Foster, for many years connected with the railroad as General Freight Accountant, has resigned, and J. C. Miller, formerly of Springfield, Mass., and for a number of years chief clerk, has been promoted to the position, with the title of Freight Auditor.

Boston & Lowell.—The following directors were elected at the annual meeting in Boston, Mass., Jan. 6: T. Jefferson Coolidge, W. Powell Mason, Edwin Morey, Frederick E. Clarke, Charles E. Cotting, George A. Gardner and Walter C. Baylies.

Central Vermont.—E. W. Horner, Roadmaster of the Rutland Division, has resigned, and E. B. Bigelow, Assistant Roadmaster for some time, has been promoted to succeed him.

Chattanooga Southern.—P. L. Dudley has been appointed General Freight Agent and B. J. Robertson Auditor and General Passenger Agent. Mr. Dudley was at one time General Passenger Agent of the Toledo, St. Louis & Kansas City and was later General Freight Agent of the Cincinnati, Lebanon & Northern.

Chester Creek.—The company had its annual meeting at Chester, Pa., Jan. 11, and elected the following directors: J. N. DuBarry, Richard Peters, George K. Crozier, H. D. Welsh and George Wood. Eben F. Barker was re-elected President.

Cincinnati, Jackson & Mackinaw.—The office of Comptroller has been abolished, with the retirement of F. S. Anable. W. F. Booth has been appointed Acting Auditor of the road to succeed Mr. Anable.

Cleveland, Cincinnati, Chicago & St. Louis.—W. D. Holliday, General Agent at Sandusky, O., has been promoted to the position of Assistant General Freight Agent, with headquarters at St. Louis. Mr. Holliday was for some years connected with the Cincinnati, Jackson & Mackinaw road and the Sandusky Division.

Columbus & Xenia.—The annual meeting of the stockholders was held in Columbus, O., Jan. 7. The following directors were elected: P. W. Huntington, John W. Andrews, George M. Parsons, R. A. Harrison, Alfred Thomas, Robert S. Smith, W. B. Hayden, James A. Swan, Rutherford H. Platt, B. F. Martin, Columbus; Henry Hanna, Cincinnati; Thomas D. Messler, Pittsburgh. P. W. Huntington was elected President and Robert S. Smith, Treasurer.

Coudersport & Wellsboro.—The following are the incorporators of the company: T. H. Goodyear, Austin, Pa., President; C. W. Goodyear, Buffalo, N. Y.; W. J. Lewis, Coudersport, Pa.; W. H. Sullivan, W. N. Metcalf, W. V. Harvey, L. T. Johnson and Daniel Collins, all of Austin, Pa.

East Tennessee, Virginia & Georgia.—George W. Stevens, formerly Purchasing Agent of the Ohio & Mississippi, has been appointed Purchasing Agent of this road with headquarters in Cincinnati. He succeeds J. E. Wilcox, of Knoxville, Tenn.

Erie & Pittsburgh.—The stockholders of the road held their annual meeting in Erie, Pa., Jan. 11. Joseph M. Carter, M. M. Taylor, Charles H. Strong, and William Brewster, of Erie; Charles H. Roberts, of Philadelphia; James A. McCrea of Pittsburgh, and Charles S. Fairchild, of New York, were elected Directors. Charles S. Strong, of Erie, was elected President and William Brewster, Secretary and Treasurer of the company.

Fairhaven & New Whatcom.—Articles of incorporation for the company have been filed in Washington by Edmund Cosgrove, J. E. Baker, J. A. Cook, Hugh Eldredge, M. C. Thum and J. A. Kerr.

Grand Trunk.—The car shops at Brantford are being removed to London, Ont., and Capt. John Karr, Mechanical Superintendent of the works, has been directed to take charge of the shops at London. Mr. Burnley, Assistant Foreman, will assume control of the Brantford works temporarily pending the removal.

Hinton & New River.—A meeting of the stockholders was held at the office of L. M. Dunn, at Hinton, Summers County, W. Va., on Friday last, and the following directors were elected: J. C. James, J. H. Miller, J. Alex. Parker, L. M. Dunn, A. B. Perkins, E. O. Prince, G. G. Gooch, W. A. Rinehart, R. R. Flannagan and J. C. Carpenter. The directors elected J. H. Miller, President; J. C. James, Vice-President; J. Alex. Parker, Secretary, and L. M. Dunn, Treasurer.

Hoosac Tunnel & Wilmington.—The following officers have been elected for the consolidated company: President, D. H. Newton; Vice-President, James Ramage; Treasurer, John C. Newton; General Superintendent, Moses Newton.

Knox & Lincoln.—At the annual meeting of the road, recently held at Portland, Me., these directors were elected: W. G. Davis, Payson Tucker, J. S. Ricker, H. N. Jones, Portland; Arthur Sewall and Thomas W. Hyde, Bath, and John Ware, Waterville. This is a new board with the exception of Payson Tucker and J. S. Ricker. The directors chose Arthur Sewall, President; G. W. York, Treasurer, and D. W. Snow, Clerk.

Lancaster & Hamden.—At the anuual election of the stockholders of the railroad in Lancaster, O., last week directors and officers were elected for the ensuing year. John G. Reeves was elected President; William B. MacCracken, Vice-President; P. Resing, Treasurer, and Benjamin F. Dunn, Secretary.

Lancaster & Reading Narrow Gauge.—At the annual meeting in Lancaster, Pa., last week, the following were chosen as directors: A. H. Peacock, John R. Bitner, John Kelly, B. F. Brenwan, George M. Franklin, W. U. Hensel, William Leaman, George W. Hensel, C. H. Geiger, Kaleb Montgomery, Daniel Herr, Daniel Barr and P. M. Hess. A. H. Peacock was re-elected President.

Louisville & Nashville.—Louis Stewart, Chief Clerk in the freight office at Louisville, has been appointed Assistant General Freight Agent to succeed P. J. McGovern, resigned.

Louisville Southern.—H. F. Smith, formerly Superintendent of Terminals at Louisville, has been appointed Division Freight Agent of the Louisville Southern Railroad Division of the Queen & Crescent, with headquarters at Louisville, vice A. V. LaFayette, resigned.

Missouri Pacific.—L. L. Keller, of Dallas, Tex., has been appointed Division Superintendent of the Fort Scott, Wichita & Western, vice R. Harding, resigned, with headquarters at Wichita, Kan.

Monongahela River & Street's Run.—The company has elected the following first board of directors: John Lloyd, Altoona, Pa, President; Richard Coulton, E. M. Gross, Thomas Donahoe and F. Miller, Greensburg, Pa.; Wm. F. Lloyd, Pittsburgh, Pa., and B. M. Shanly, Newark, N. J.

Natchitoches.—These directors and officers were re-elected at the annual meeting in Natchitoches, La.: L. Caspari, Joseph Henry, A. E. Lemee, W. J. Behan, B. Beer and W. B. Ringrose. President, Leopold Caspari; Vice-President, Joseph Henry, and Secretary and Treasurer, A. E. Lemee.

Nebraska Southern.—The annual meeting was held at Omaha, Jan. 5. The directors chosen are: Jay Gould S. H. H. Clark, Milton T. Barlow, Leavitt Burnham, J. B. Evans, R. S. Hall and Harry Gilmore.

Newport News & Mississippi Valley Co.—F. B. Staines, of Henderson, Ky., has been appointed Assistant Purchasing Agent of the Newport News & Mississippi Valley.

New York Central & Hudson River.—A. T. Dice has been appointed Superintendont of Signals on the Hudson and Harlem Divisions, with office at the Grand Central Station, New York City.

New York & New England.—Austin Corbin, the new president of the road, has appointed Everett R. Reynolds assistant to the president, and Charles M. Jacobs to be consulting engineer. Mr. Reynolds has been connected with the Long Island Railroad for several years, and was Mr. Corbin's private secretary until promoted to be assistant to the president. Mr. Jacobs is the consulting engineer of the Long Island road.

Nipissing & St. James Bay.—The annual meeting of the company was held last week. The following Board of Directors was elected: W. B. McMurich, Hon. F. Smith, C. T. Campbell, Wm. Hendrie, A. Nairn, John Bell, Q. C., E. Wragge, E. Girouard, M. P., A. Desjardins, M. P. At the directors' meeting W. B. McMurich was elected President, and E. Wragge, Vice-President.

Ohio & Mississippi.—J. Helms, of the Missouri Pacific road, has been appointed Superintendent of the shops at Washington, Ind.

Omaha Belt Line.—The annual meeting was held at Omaha, Neb., Jan. 5. The following directors were elected: Jay Gould, S. H. H. Clark, George C. Smith, R. S. Hall, Leavitt Burnham, Harry Gilmore and J. B. Evans. S. H. H. Clark was chosen President and G. C. Smith, Secretary, and A. H. Calef, Treasurer.

Orchard Beach.—The annual meeting resulted in the re-election of the old Board of Directors. Hon. Frank Jones was chosen President, vice George C. Lord, and M. L. Williams Clerk, in place of George F. Calef.

Philadelphia & Reading.—The annual meeting was held in Philadelphia, Jan. 11. The following Board of Managers were elected without opposition: President, A. A. McLeod; Managers, A. J. Antelo, Thomas Cochran, George De B. Keim, Thomas Dolan, James Boyd and Samuel R. Shipley. Treasurer, William A. Church. Secretary, William R. Taylor.

Philadelphia, Wilmington & Baltimore.—At the annual meeting of the company in Wilmington, Del., Jan. 12, directors were elected as follows: George B Roberts, William Sellers, Christian Febiger, John P. Green, J. N. Du Barry, Benjamin F. Newcomer, Frank Thomson, Skipwith Wilmer, Edward Lloyd, Henry D. Welsh, E. Tatnall Warner, German H. Hunt, Benjamin B. Comegys, N. Parker Shortridge. The directors elected officers as follows: President, George B. Roberts; Vice-President, Frank Thomson; Secretary, J. C. Sims; Treasurer, Robert W. Smith.

Richmond & Danville.—An adjourned meeting of the stockholders of the railroad was held at Richmond, Va., Jan. 12. John H. Inman was re-elected President and the following board of directors was chosen: Samuel Thomas, John G. Moore, John A. Rutherford, Samuel M. Inman, James B. Pace, Calvin S. Brice, C. M. McGhee, George J. Gould, W. G. Oakman, James Swan, W. E. Strong and T. M. Long. The three last named are new members of the board, and succeed John C. Calhoun, Senator John S. Barbour, who declined re-election and John H. Hall, deceased. The election is a temporary one, and the directors have agreed to resign at the request of the Richmond Terminal directors, when the reorganization plans of the latter company have been completed.

St. Louis Southwestern.—The Purchasing Agent's office has been abolished. F. W. Schaurte, the Purchasing Agent, will remain with the company for some weeks yet, but the department will be included in the jurisdiction of Abram Gould, Purchasing Agent of the Missouri Pacific.

St. Louis, Vandalia & Terre Haute.—The annual meeting was held at Greenville, Ill., Jan. 12. Directors were elected as follows: Thomas D. Messler, James McCrea, W. R. McKean, Charles H. Seybt, E. O. Standard, R. L. Dulaney, A. G. Henry, J. S. Peers and W. H. Barnes. The officers elected by the Board were: Thomas D. Messler, President; S. B. Liggett, Secretary; C. D. Hollis, Assistant Secretary; T. H. B. McKnight, Treasurer.

Sandusky & Ashland Southern.—At the annual meeting of the company at Sandusky, O., the following directors were chosen: Hon. John Mackey, C. L. Wagner, A. W. Miller, Sandusky; Hon. C. P. Wickham, Norwalk; W. T. Alberson, Ashland. The following officers were chosen: John Mackey, President; C. P. Wickham, Vice-President; A. W. Miller, Secretary and Treasurer; John B. Hoxsey, New York, Manager.

Sandusky & Columbus Short Line.—The stockholders of the company held their meeting at Sandusky, O., last week and elected the following board of directors: J. H. Stewart, H. C. Post, T. B. Taylor, E. H. Zurhorst, Sandusky; F. J. Picard, D. B. Hatch, New York; H. D. Turney, Columuus. The directors organized as follows: President, H. C. Post; Vice-President and General Manager, F. J. Picard; Secretary, E. H. Zurhorst, and Treasurer, T. B. Taylor.

Southern Pacific.—Reports relative to car movements and mileage should be sent to William McKay, Car Accountant, Pacific System, San Francisco, Cal., instead of as heretofore to C. J. Wilder, Freight Auditor.

Terre Haute & Indianapolis.—The annual meeting was held in Terre Haute, Ind., Jan. 4. The directors elected for the next year are: W. R. McKeen, D. W. Minshall, Henry Ross, Josephus Collett, John G. Williams, Herman Hulman and George E. Farrington. The directors elected these officers: President, W. R. McKeen; Vice-President and General Manager, John G. Williams; Secretary, George E. Farrington; Treasurer, J. W. Cruft.

Terre Haute & Logansport.—The annual meeting was held at Terre Haute, Ind., last week, and the following board of directors was chosen: W. R. McKeen, John G. Williams, D. W. Minshall, George E. Farrington and Frank McKeen. The directors elected these officers: President, W. R. McKeen; Secretary and Treasurer, George E. Farrington.

Union Pacific, Denver & Gulf.—E. W. Hayes has been appointed Master Mechanic of the Fort Worth & Denver City road, with headquarters at Fort Worth, vice John F. White, resigned.

Western New York & Pennsylvania.—At the election of directors which began on Monday, Jan. 11, and closed on Tuesday, President Calvin H. Allen and Directors Adolph Engler, Pascall P. Pratt and Isaac N. Seligman were defeated for re-election, and Nicholas Thowron, J. Rundle Smith, William C. Bullitt and John K. Barclay, of Philadelphia, were elected in their places. This insures the election of Samuel G. DeCoursey as President.

Wilkesbarre & Western.—At the annual election of the stockholders of the company in Philadelphia this week the following directors were elected: Joseph M. Gazzam, Charles D. Barney, Morris Liveright, John B. Stetson, W. C. De Armond, Max Bamberger and S. P. Haupt, of Philadelphia, and R. T. McCabe and Charles Raht, of New York. J. M. Gazzam, of Philadelphia, was elected President.

Zanesville, Newcomerstown & Cleveland.—The stockholders of the company have re-elected the following directors and officers: A. M. Beers, Edward Spencer, H. H. Squair, J. F. Fletcher, Willis Bailey, Edmund Turner and Benjamin Wheeler, Directors; and A. M. Beers, President; Edmund Turner, Vice President; D. B. Lynn, Secretary, and Benjamin Lynn, Treasurer.

Zanesville & Ohio River.—J. Hope Sutor, of Zanesville, O., has been appointed General Manager of the road. He has been previously Secretary and Treasurer.

RAILROAD CONSTRUCTION.
Incorporations, Surveys, Etc.

Alberta.—This company is applying to the Dominion Parliament for power to construct a railroad from the westerly end of the line through the Crow's Nest Pass to some point on the Canadian Pacific in British Columbia.

Baltimore & Cumberland.—The charter for this company was filed in Maryland last week. The capital stock is placed at $1,000,000, and the company is organized to construct the extension of the West Virginia Central & Pittsburgh, east of Cumberland, Md., to Hagerstown and toward Baltimore. The route has been surveyed between Cumberland and Hagerstown, and is now being surveyed east of Hagerstown.

Baltimore & Ohio.—A second track will be laid from Fairmont, W. Va., station to Gaston Junction, about four miles, to accommodate the traffic of the Monongahela River road to the station without the necessity of the latter using the tracks of the main line of the Baltimore & Ohio.

A large force of men is at work on the Pawpaw tunnel in West Virginia, widening it so as to accommodate double tracks. The tunnel is over 300 ft. long, and is cut through solid rock, and it is expected, as the work will necessarily be slow and conducted so as not to interrupt travel, it will be at least eight months to finish.

The demand for increased room in the yards of the Baltimore & Ohio Railroad, at Parkersburg, W. Va., has made it necessary for that company to put in four new tracks to give room for storing 300 more cars.

Bristol, Elizabethton & North Carolina.—Swafford Bros. have a contract for construction work on a portion of the line between Bristol and Elizabethton, Tenn., and are now at work on the line.

Brunswick, Western & Southern.—This company, which proposes to build a railroad from Wilmington to Southport, N. C., continues to purchase property at Southport, N. C., for terminal facilities. The company's application for a subscription of $100,000 by Brunswick County was not granted, and an offer of a subscription of $25,000 by the town of Southport was declined. The company asserts that it will build the road, if granted the right of way, through Southport. H. H. Dougherty, is General Manager.

Canadian Pacific.—The new road between St. Andrews and Lachute, Que., has been built from St. Andrews, on the Ottawa River, in the County of Argenteuil, to the village of Lachute, a station on the Canadian Pacific. Its length is about seven miles, and was built by Mr. C. N. Armstrong, of Montreal, who obtained subsidies from both the Quebec and Dominion governments.

Central Counties.—This new road from Glen Robertson, on the Canada Atlantic northeast to Hawkesbury, Que., on the Ottawa River, was opened for traffic last week. The new line is 21 miles long. The stations are Glen Robertson, Dalkeith, Vanleek Hill, and Hawkesbury. The road will be operated by the Canada Atlantic, connection being made at Glen Robertson 66 miles east of Ottawa. Hawkesbury is an important lumber centre.

Champion Lumber Co.—A branch road is being built by this company, principally for its own use, from near Meridian, Miss. About one mile is now graded, and 75 men are building the line at present. The maximum grade is 158 ft. to the mile, and the maximum curve, 12 degrees. The money is on hand to build the road as now projected before May 1 next. H. S. Sweet of Harrisburg, Miss., is President, and W. W. Brandon, of Meridian, Miss., is Chief Engineer.

Charleston, Clendennin & Sutton.—W. M. Reynolds and a party of engineers left Charleston, W. Va., last Thursday to locate the permanent line on this road from Charleston to the Clay County line and to make a new survey from that point to Sutton, Braxton County.

Bids for the construction of the road from Charleston to the Clay County line will be received at the office of the company at Charleston until Jan. 20, at which time the contract will be let.

Chesapeake, Shendun & Western.—This company has been incorporated to build a road from a point on the Baltimore & Ohio in West Virginia, easterly through the counties of Rockingham, Augusta, Orange and Spottsylvania in Virginia to a point on Chesapeake Bay.

Chicago & Alton.—The following is the substance of a press dispatch from Chicago: The company has decided to expend $500,000 for improvements, and an order has just been given to buy a number of 10-wheel locomotives. The shops in Bloomington, Ill., will be run to their greatest capacity in manufacturing engines and coaches. Thirty new passenger cars are now being built in these shops. At all of the crossings interlocking switches with the latest safety appliances will be put in. The double track between Bloomington and Chicago will be completed not later than June 1 next.

Chicago, Rock Island & Pacific.—R. W. Day is quoted in a dispatch from Topeka, Kan., as saying that contracts had been let for grading 18 miles of road from Minco, I. T., the present terminus of the road, south to the Washita River, and that Fort Worth or Dallas, it has not been settled definitely which, will be as far as the road will be built until the location of the deep water terminus is determined. The extension now in course of construction will involve the building of 300 miles of track.

Chihuahua & Durango.—Hanson A. Risley, George H. Parsons, R. H. Graham and J. E. Launstrom, all of Colorado Springs, Colo., are the incorporators of the Chihuahua & Durango Development Co., for the construction of a railroad between Durango and Torreon, State of Chihuahua, Mexico with sawmills, smelters and pipe lines. The directors are: J. E. Gates, William Wahl, G. E. Niles, A. K. Vandewenter and Charles Knapp. The capital is $250,000.

Cleveland & Pittsburgh.—The company has presented petitions to the city councils of the various cities through which it passes between Rochester, Pa., and Bellaire, Ohio, asking permission to lay an additional track over its right of way through those cities. The only point at which the privilege is needed is at places where the right of way crosses streets.

Corillos Coal.—This railroad company, with a capital stock of $2 500,000, has filed a charter in New Mexico. The incorporators are A. G. Taylor, of Chicago; R. C. Kerens, Charles H. Smith, P. M. Hoefle, F. W. Risque and F. W. Schuarte, of St. Louis, and R. J. Pulen, of Santa Fe. The charter calls for the building of 75 miles of line, starting at Corillos, on the line of the Santa Fe, and extending south and west through the coal and mineral fields to San Pedro. Construction will begin

shortly. This road will open one of the richest coal and mining regions in the West. The Corillos Coal & Iron Co. and the Santa Fe are working in harmony on the new project.

Duluth & Iron Range.—An engineering party is now in the field, locating the branch line to be built from the main line at Mesabi station to the Mesabi Iron Range in the northern part of Minnesota.

Gainesville, La Crosse & Lake Butler.—The survey will begin in a few weeks for this road, recently chartered in Florida. The route will be from Gainesville to Lake Butler and from Gainesville to Tampa Bay. The company has completed its organization and elected I. E. Webster, President; J. S. Twomer, Vice-President; C. L. Fildes, Secretary, and J. R. Eddings, Treasurer.

Great Northwest Central.—Construction work will be proceeded with as soon as spring opens on the extension beyond Charter, Man., and it is now proposed that during next season 100 miles will be graded. This construction will take the line into the territories.

Gurleys & Paint Rock Valley.—This company, which proposes building a railroad from Winchester to Deposit, Ala., has increased its capital stock from $100,000 to $250,000, and will probably soon issue bonds. Samuel I. Wheatcroft will, it is stated, soon commence surveying the road. Frank Gurley, of Gurley, Ala., is President.

Hinton & New River.—The organization of the company was completed at a meeting at Hinton, W. Va., and the directors authorized the president and secretary to engage engineers to complete the surveys and estimates of the cost of construction. The treasurer has opened the stock books at Hinton. The intention of the company is to build a line from a connection with the Chesapeake & Ohio at Hinton to a connection with the Norfolk & Western at the mouth of East River. The route will begin near the mouth of the Greenbrier River, following New River, and thence along East River to its mouth in Mercer County.

Kanawha & Michigan.—Since this company succeeded the Kanawha & Ohio road the entire line has been relaid with oak ties and 67 lb. rails have been placed in the main track for nearly the entire length of the road. New steel bridges have been constructed in the places of five wooden ones, and the entire equipment has been overhauled, repaired and put in good condition and considerable new rolling stock has been purchased.

La Pierre Phosphate Co.—The short branch projected by this company to its phosphate mines in North Florida, near Tallahassee, will probably be built by the Augusta, Tallahassee & Gulf road. That company has agreed to build a standard gauge branch, two miles long, when it begins the construction of its line; therefore no arrangements has been completed for the independent construction of the road.

Mexican Gulf, Pacific & Puget Sound.—A surveying party in charge of H. McLaughlin, of St. Louis, and Charles Seymour, of Nasbville, Tenn., has started out to locate permanently the line of the road beyond Pensacola, Fla. It is stated that grading will begin on the road as soon as 100 miles have been located.

Monongahela River & Street's Run.—The company filed its charter papers at Harrisburg, Pa., last week. The road proposed is to extend from a point on the Monongahela River, near Hays Station, on the Pittsburgh, McKeesport & Youghiogheny road to a point near Willock, Allegheny County, Pa., a station on the Wheeling Division of the Baltimore & Ohio Railroad. The length of the road will be three miles. The capital stock will be $30,000.

Montana Central.—Foley Brothers & Guthrie, of St. Paul, Minn., have been awarded the contract for building a 6½-mile spur to the Anaconda mines.

New Roads.—F. H. Steber has commenced surveying a route for the railroad from Trinity to Temple, Tex. After the survey has been completed the citizens will submit a proposition to the Missouri, Kansas & Texas to secure its aid and interest in building the road.

The Ravenden Springs Land Co., organized by John B. Jones, of Little Rock, and others, will probably build a nine-mile railroad from Ravenden Springs, Ark., to a connection with the Kansas City, Fort Scott & Memphis Railroad.

It is reported that a standard gauge line to be operated by steam motors will be built from Tallapoosa to Bluffton, Ala., along the line of the projected Georgia, Tennessee & Illinois road, by Madison Garretson, of Cincinnati, O., and L. F. Bellinger, of Tallapoosa.

Right of way is now being secured by coal operators owning mines at Massillon, O., and in the Tuscarawas Valley for a railroad from Justus, the junction of the Cleveland & Canton and Cleveland, Lorain & Wheeling roads, up the Pigeon Run Valley over the original but abandoned survey of the Wheeling & Lake Erie road. It goes through East Greenville and on to Dalton, on the Wheeling & Lake Erie road. The distance is about 11 miles, and it is estimated thatit will cost $40,000 to build the road.

The town of Prairie Grove, Ark., has raised $10,000, and proposes increasing this amount for the purpose of inducing some company to build a railroad from Fayetteville, or some other point on the St. Louis & San Francisco Railroad, to Prairie Grove. It is expected that the bonus will be $25,000.

Norfolk & Western.—Although the weather has been unpropitious, the company has pushed the work with all possible rapidity on the extension beyond Dunlow, W. Va., and still has a large force of men at work. The extension is now in regular operation from the Ohio River at Kenova along the Twelve Pole River to Dunlow, 46 miles. Trains run through from Columbus, O., 185 miles, to Dunlow.

Ottawa & Parry Sound.—The survey on this line west of Ottawa has now reached Egan's, on the Madawaska River, a point which is 12 miles west of Bark Lake, Ont., and more than half the distance between Ottawa and the connection with the Parry Sound Colonization road.

Oxford Mountain.—The extension of this road north to Kingsly, Que., is to be commenced early in the spring. During the winter there will probably be no regular train service, but next summer the road will be operated both for freight and passenger traffic. It is at present completed between Eastman and Lawrenceville, Que.

Pennsylvania.—We print below a compilation prepared by the Chief Engineer of the Pennsylvania, showing the miles of track owned and operated by and associated in interest with the Pennsylvania Railroad on Jan. 1, 1892. The lines east of Pittsburgh and Erie, aggregate in mileage 4433.45 (not including 324 miles of canals and ferries), with a total of 8546.90 miles of tracks of all kinds; being an increase of 86.85 miles of line and 258.76 miles of track during the year 1891. The increased mileage of lines is due to the completion and extension of the following lines: New York Bay Railroad extension, 1.74 miles; Kensington & Tacony, 0.69; Alloway & Quinton, 4.22; Pencoyd branch, 1.28; Trenton cut-off, 44.96; extension Clearfield branches, 8.23; South Fork Railroad, 7.93; Turtle Creek Valley Railroad, 6.41; Turtle Creek Branch, 2.02; West Pennsylvania branches, 9.54; Pittsburgh & Bessemer, 1.47; and miscellaneous extensions, 2.33 miles, a total of 90.85 miles. Four miles of road have been taken up, the net increase being 86.85 miles.

The Pennsylvania Railroad Co., east of Pittsburgh and Erie, owns 507.48 miles, leases 2012.54 miles and controls, through other tenures, 1913.43 miles of railroad, located in eight states.

West of Pittsburgh and Erie the lines aggregate 3412.34 miles, and a total trackage of 5129.72 miles, being an increase over the previous year of 15.26 miles of line and 115.80 miles of track, the same being located in seven states. The increase in road is on the Pittsburgh, Youngstown & Ashtabula, 5.88 miles; Marginal Railroad, Beaver Falls, Pa., 2.96 miles; Haaks Spur, Grand Rapids & Indiana, 4.09 miles, and miscellaneous extensions, 2.33 miles.

The grand total of all lines (east and west of Pittsburgh and Erie) in which this company is interested shows a mileage of 7845.79 miles of railroad line, 13,676.02 miles of railroad track and 324 miles of canals and ferries, an increase during the year of 102.11 miles of railroad and 374.65 miles of tracks of all kinds.

The Trenton Branch, between Glen Loch, Pa., and the Schuylkill, was formally opened Jan. 11, for freight traffic only. The opening of this portion of the new branch establishes another line connecting the main line and the Schuylkill Valley Division, the junction with the latter being at Ernest, a mile and a half north of Norristown. The Trenton Branch crosses the Schuylkill Valley line 30 ft. above grade, but the connection is made on an easy grade. With the opening of the Trenton Branch for freight traffic its entire length, all the passenger trains hitherto running between Norristown and Morrisville have been withdrawn.

The contract for the grading and masonry for the four-track road from Valley Creek to Downingtown, Pa., including a new stone arch bridge over the Brandywine Creek, has been let to Brown Bros. & Sims, Philadelphia. The double tracking of the Mount Joy road from Dillerville to Landisville, Pa., six miles, has been let to John G. Nill, of Philadelphia. From a point west of Elizabethtown to Hillsdale Station, including a stone bridge over the Conewago Creek 87 ft. above the water, the contract has been let to P. McManus, of Philadelphia, and from Hillsdale Station to branch intersection near Middletown to James McGraw, of Lancaster, Pa.

Philadelphia & Reading.—The engineers of the company are reported to be prospecting for a new branch to extend from a point on the Atlantic City line of the Reading at Pleasantville, near Mays Landing north to a point on the New Jersey Southern road, near Woodmansie, N. J. The distance is about 30 miles, the proposed line being directly north. It is said that people along the line of the proposed road have subscribed liberally to the stock. The road as at present surveyed would pass through Port Republic, Bass River, Harrisville, Absecon, Bridgeport, Oswego and other small towns.

Pittsburgh, Ohio Valley & Cincinnati.—The bridge over Pipe Creek, which was the cause of a serious delay in the work on this line, has been completed, and the first train hauling rails, ties and construction material passed over to the south last week. Heretofore all supplies have been hauled by wagon, and as the roads were very bad, the work has necessarily been slow. From this on it will be possible to work much more rapidly and satisfactorily, and it is expected that the line will be completed nearly to Marietta by the time warm weather sets in.

Ravenswood, Spencer & Glenville.—The road is now in operation from the Ohio River to Spencer, W. Va., as already noted, and plans have been proposed for its further extension, work to begin in the spring. The original intention was to build an independent line from Ravenswood to Glenville, but the building of the West Virginia & Pittsburgh road through the same territory, and both roads being capitalized by practically the same people, the plan has been changed, and the road will be built to connect with the West Virginia & Pittsburgh road at Burnsville, Braxton County.

Southern Pacific.—The bids for the construction of two tunnels, one of 3,600 ft. and one of 1,400 ft., to be built on the new line between Santa Margareta and Ellwood, Cal., were received by the Chief Engineer Jan. 1, but no award will be made for some time.

Syracuse & Oneida Lake.—The route of this road, whose organization has been referred to, is described as follows: From Messina Springs, N. Y., to a point on the line between Onondaga and Madison counties on the south shore of Oneida Lake near the mouth of Chittenango Creek, 12 miles. Connection is made at Messina Springs, with the Syracuse, Eastwood Heights & De Witt (Electric) Railroad for Syracuse, four miles. The surveys have been completed for the new line and the work of construction will probably soon be commenced and will be done by the company. There is one seven mile tangent and one three mile tangent, two four degree curves are the maximums. Walter F. Randall, of Syracuse, is Chief Engineer.

Taveres, Atlantic & Tampa.—E. L. Ferran, G. A. Aber and others are organizing this line, which, as already noted, is to build the railroad previously mentioned and projected from New Smyrna west to Orlando, Fla., crossing the St. John's River at or near St. Francis, through Seneca and Eustis to Tavares, and from thence to Mascotte.

Terre Haute, Saylor Springs & Chester.—This company has been organized at Saylor Springs, Ill., incorporated in Illinois. The following compose the first Board of Directors: Lewis W. Barnes, Benjamin T. Bealfe, Andrew J. Allen, Warren C. Rhodes, Thomas Hanifant, Osman Pixley and N. Hulman. The capital stock is $3,300,000. The points named in the charter are a point on the eastern boundary of Clark County, Ill., via Saylor Springs to Chester, Randolph County, Ill. The incorporators state that a portion of the right of way has been secured and that work will begin soon.

Toledo, Walhonding & Ohio.—Surveys have been made for a connection between this road and the Pittsburg, Ohio Valley & Cincinnati road. Gen. A. J. Warner, of Marietta, President of the latter line, has had charge of the surveys, which start at Powhattan, on the Ohio River, and extend westerly, connecting with the Walhonding line by way of Parnesville, O.

Velasco Terminal.—So far nine miles of rails have been laid for the Velasco Terminal line, and the contractor says the remaining 10 miles northwest to Chenango, Tex., will be completed by Jan. 21, and the line opened for traffic.

Virginia Roads.—The following bills incorporating railroad companies, introduced at the present session of the Virginia Legislature, have been reported favorably from committee, and have either been already enacted or will probably become laws: Baltimore, Richmond & Southern, to extend from Baltimore, Md., southwest to Richmond, Va., a distance of about 140 miles; Marion & Rye Valley; Roanoke, Salem & Western, from Roanoke northwest to New Castle, 17 miles; Southwest Virginia Central; Richmond & Southwestern; Norfolk & South Mills; Richmond, Blackstone & Southern; Potomac & Great Falls; Roanoke & New Castle Railway & Mining Co., and Roanoke, Fincastle & Clifton Forge; the Big Stony Railroad, to construct a line from a point on the Norfolk & Western in Giles or Pulaski County to some point in Giles or Craig County, Va.

The following companies have applied for an extension of time for commencing construction work: The Radford & Little River, chartered to build from Radford, Va., southwest through Montgomery County to iron and zinc mines in Pulaski County, and the Washington & Western.

Washington & Chesapeake Beach.—The surveys will probably begin in a few weeks between the connection with the Pennsylvania lines near Bennings, south of Washington, D. C., to Chesapeake Beach, Md., south of Bay Ridge. The line is to be about 30 miles long.

West Virginia, Central & Pittsburgh.—Regarding the extension of this road from Cumberland, Md., eastward, an officer writes that a preliminary survey has been made from Cumberland to Hagerstown via Hancock, Md., a distance of 67 miles. The line now being run by the engineers is a reconnaissance from Hagerstown to Baltimore via Frederick. At present no definite information can be given as to how soon the building of any part of this extension will be commenced, or what further work will be done.

Wheeling & Lake Erie.—Hon. Robert H. Cochran, President of the Wheeling Bridge & Terminal Railway Co., is authority for the statement that negotiations which have been pending between that company and the Wheeling & Lake Erie, whereby the latter company sought to obtain an entrance to the city of Wheeling, have culminated in an arrangement, to begin Feb. 1, under which all trains on the Wheeling & Lake Erie Railroad will arrive and depart from the Wheeling Bridge & Terminal Co.'s union station at the corner of Seventeenth and Market streets, in Wheeling. The road will also use the Terminal system's lines for its freight traffic, and will have access to all the yards connected with the Terminal Co.'s property.

Winnipeg & Hudson Bay.—Mr. Neilson, a surveyor, has returned from an exploring expedition to the northwest of the Saskatchewan in the interest of the railroad company. He has been with the party for the last three months, and made a thorough examination of the country, going as far as York Factory. Mr. Neilson was acting in the interest of Messrs. Ross, McKenzie and Holt, who it is understood will be the contractors for the road if construction work is started. He said there was no doubt the road could be built up through that country, although it might cost a large sum.

Wolsey & Fort Qu' Appelle.—This company is applying to the Dominion Parliament for power to build a line 40 miles in length, between Wolsey and Qu' Appelle, Northwest Territories.

Yankton, Norfolk & Southwestern.—This line will extend from Yankton, S. D., to Norfolk, Neb., and will be 60 miles in length. Some of the grading on the Yankton end was done last year, and according to the terms of the bonds voted by the townships along the line the road must be completed this year. The amount of these bonds is sufficient to grade the entire line, and engineers are now perfecting the survey in order that work may be begun early in the spring.

GENERAL RAILROAD NEWS.

Atlanta & Florida.—A bill asking for the appointment of a receiver for the Atlanta & Florida road has been filed before Judge Clark at Atlanta, Ga., and a receiver will probably be appointed this week.

Chicago, Madison & Northern.—The Chicago, Madison & Northern and the Addison Railroad, both Illinois corporations, this week filed with the Secretary of State articles of consolidation, under the terms of which the former company acquires all the property of the latter. The roads connect at South Addison station, in Du Page County. They are controlled by the Illinois Central.

Cincinnati, Hamilton & Dayton.—The suit of the company against William R. McKeen, President of the Terre Haute & Indianapolis, was this week transferred to the Supreme Court of the United States by the United States Court of Appeals at Chicago. The sum of $889,000 is involved in the suit, and the Court of Appeals decided that the case was of such importance that it should go to the highest court at once. The questions at issue are whether the railroad had the corporate power to enter into the contract with McKeen for the purchase of the stock, or whether McKeen had proper notice in the transaction. The suit is based on negotiations which were made by Mr. McKeen with Henry S. Ives, when he was in control of the Cincinnati, Hamilton & Dayton.

Cincinnati, Jackson & Mackinaw.—Both divisions of the road have been resold, and purchased for the reorganization committee. The northern division, purchased by the committee at the first sale, was resold last week, and bid in by the representative of the committee. The reorganization plans will probably be purchased in February.

Cleveland & Pittsburgh.—The receipts and disbursements for the fiscal year ending Nov. 30 were as follows: Total receipts $1,302,101.73, total disbursements, $1,304,400.76; deficit for the year, $2,299.03.

East Tennessee, Virginia & Georgia.—The railroad reports gross earnings for November of $688,438, a decrease of $38,637 as compared with the same month of the previous year, and net earnings of $187,819, an increase of $5,708. For the five months ending Nov. 30 the gross earnings were $3,424,041, a decrease of $213,192 as

compared with the corresponding period of the previous year, and net earnings were $692,816, a decrease of $21,386.

Great Northern.—The following is a statement of earnings for December and the half year:

	Month of December. 1891.	1890.	Inc. or dec.
St. P., M. & M leased lines	$1,289,385	$974,945	I. $314,440
Eastern Ry. of Minn.	114,960	40,887	I. 74,073
Montana Central Ry.	112,433	116,485	D. 4,052
System	$1,516,778	$1,132,317	I. $384,461
Six months ending Dec. 31:			
St. P., M. & M. leased lines	$7,402,301	$6,245,834	I. 1,156,294
Eastern Ry. of Minn.	764,182	413,792	I. 350,390
Montana Central	660,295	655,152	I. 5,143
System	$8,826,889	$7,315,033	I. $1,511,827

Hoosac Tunnel & Wilmington.—The Hoosac Tunnel & Wilmington, the Deerfield Valley and Deerfield River railroads in Southern Vermont, extending north from the Hoosac Tunnel, Mass., to Wilmington, Vt., consolidated last week under the name of the Hoosac Tunnel & Wilmington Railroad. The capital is $210,000, and the road will issue first mortgage bonds to the amount of $180,000.

Iowa Central.—The Reorganization Committee has decided to distribute common treasury stock to those stockholders who had paid their assessment at the time of the reorganization. The stock so distributed represents what would have been issued if all had paid assessment on the old stock. This is to be done in accordance with the bondholders' agreement. The stock is to be distributed ratably to holders of the old securities, and they will receive preferred stock for the amount they pay in. An injunction has been obtained against the company, restraining it from issuing the new stock.

Kansas City, Wyandotte & Northwestern.—Jay Gould has been sued for $435,000, alleged to be due on a contract by which he was to obtain possession of the Northwestern road for the Missouri Pacific, and which he has failed to carry out.

Louisville & Nashville.—The following statement shows the earnings for the six months to Dec. 30:

	1891.	1890.	Inc. or dec.
Gross earnings	$11,070,021	$10,034,375	I. $1,035,646
Operating expenses	7,06 ,451	6,240,606	I. 822,845
Net earnings	4,006,570	3,793,769	I. 212,801
Fixed charges	$2,678,644	$2 335,324	I. $343,320
Balance	1,328,926	1,458,445	D. 130,519
Other income	248,765	249,000	D. 235
Total	$1,576,691	$1,707,445	D. $130,754
Loss on branch roads	82,148	168,855	D. 86,707
Surplus	1,494 543	1,538,590	D. 44,047
Dividends	1,320,000	1,200,000	I. 120,000
Balance surplus	$174,543	$338,590	D. 161,047

Milwaukee, Lake Shore & Western.—The statement of the company for the year 1891 shows: Gross earnings for 11 months, $3,289,247; December, estimated, $238,467; total gross earnings, $3,527,714. Operating expenses and taxes for 11 months, $2,052,798; December, estimated, $158,467; total, $2,211,265. Net earnings, $1,316,449; miscellaneous receipts, $4,583; total net receipts, $1,321,033; interest and rentals, $788,139; surplus for the year, $532,893.

New York & New England.—The executive committee of the railroad have appointed a special committee to discuss the question of building a second track from New Britain to Hawleyville, Conn. The committee consists of Alexander E. Orr, John L. Macauley and Frederick H. Prince. The committee is also empowered to provide a plan for paying the floating debt, which is said to be about $400,000. J. A. Bostwick, chairman of the Board of Directors, denies that a blanket mortgage with five per cent. interest is contemplated to be issued.

Northern Pacific.—The approximate gross earnings of the system for the month of December, 1891, were $2,461,099, against $2,711,286 for the corresponding period of 1890, a decrease of $250,187. The increase in mileage is 214 miles.

Old Colony.—The company sold 2,000 shares of its stock by auction at Boston this week. Messrs. Kinnecut & De Witt, of Worcester, Mass., were the purchasers. The price was 165¼, or three points above that obtained at the last sale in November.

Oregon Improvement Co.—The company reports for the fiscal year ending Nov. 30 gross earnings of $4,273,321, a decrease of $206,554 as compared with the previous year. The net earnings were $831,133, an increase of $113,487. Fixed charges were approximately $656,000, leaving a surplus of $175,133, which is equal to a little over two per cent. on the common stock.

Philadelphia & Reading.—Following is a synopsis of the annual report, which is for the year ending Nov. 30. The result of the operations of the railroad company shows: Gross receipts from traffic, $21,853,801; gross expenses, $11,862,219; earnings from traffic, $9,991,582; profit from other sources, $523,150; making a total of $10,514,732. From this should be deducted rentals, $2,838,350; interest, $4,502,882 and other sums, leaving a net profit of $2,563,247; from this should be deducted the interest and sinking funds of divisional mortgages of the coal and iron company guaranteed of the railroad company, amounting to $1,171,168; less the profit of the coal and iron company, amounting to $442,879; leaving a surplus over fixed charges of both companies of $1,864,963. Out of this surplus the Board of Managers, under the provisions of the income mortgages, has declared the full limited rate of five per cent., to be payable Feb. 1, on the first preference bonds, and 4½ per cent. on the seconds. The company is practically free from floating debt. There was an increase of the profit from the traffic of the railroad company for the year over that of the previous year amounting to $998,676, while the traffic expenses decreased $79,362. The proportion of operating expenses fell from 57.04 in 1890 to 54.28 in 1890. In pursuance of the policy of improvement there have been expended for betterments and additions of a more permanent nature, $505,000, and for cars and locomotives $1,298,465, amounting in all to $1,773,469, which was carried to capital account. Arrangements have been completed for betterments, new equipment and additional property by issuing $10,000,000 collateral trust five per cent. bonds. The proceeds are to be expended only for improvement of and additions to present mortgaged estates. It is said that these bonds have been in the company's treasury for a long time. If new lines or extensions cannot be financiered independently then their promotion will not be undertaken. Regarding the anthracite combination the report says its revenue has not reached the proportions to which it is entitled, and its concessions to other companies in the interests of harmony and maintenance of fair and reasonable prices for coal are out of proportion to the capacity of the collieries, to capital invested and its facilities for marketing coal as compared with other roads. Work on the new line to Port Reading, on the Arthur Kill, will soon be completed. The total receipts of the coal and iron company for the year amounted to $21,311,734, and the expenses $20,829,068, leaving a surplus of $482,666. After charging all payments for the year to operating expenses, the deficit is reduced to $332,860, against a deficit for 1890 of $1,420,899.

Philadelphia, Wilmington & Baltimore.—The annual report for the fiscal year ending Oct. 31, 1891, shows earnings and expenses as follows: Receipts: From freight, $3,252,688; passengers, $3,316,310; express, $203,903; mails, $181,328; miscellaneous sources, 205,906; rentals, $34,980; total, $7,194,998. Expenses: Transportation, $2,167,456; motive power, $1,383,680; maintenance of cars, $549,770; maintenance of way, $1,132,491; general expenses, $79,724; total, $5,293,122. Net earnings, $1,901,876 The increase in gross earnings is $374,021; in expenses, $42,947 and in net earnings, $331,674.

Richmond & West Point Terminal.—The Olcott Stockholders' Committee, in charge of the preparation of a plan for the reorganization of Richmond Terminal finances, had secured the majority of proxies from stockholders which had been asked for preparatory to the submission of a scheme. The committee will in a few days formulate a plan, and it is believed that it will provide for the conversion of the Richmond Terminal from a security owning into a proprietary company.

St. Louis, Vandalia & Terre Haute.—The annual report for the year ending Oct. 31, 1891, shows gross earnings of $1,808,300. The rental received by the company from the Terre Haute & Indianapolis Railroad, lessee (30 per cent. of the gross earnings), was $542,492, and income from other sources $14,052, making the total income for the year $556,545. Interest on bonds, etc., was $365,629, leaving a surplus for the year of $190,915, a gain over the preceding years of $11,384.

South Carolina.—The Olcott Reorganization Committee announces that more than a majority of the second mortgage bonds have been deposited with the Central Trust Co., to New York, together with a large amount of the capital stock. This probably puts an end, for the present, of several plans for reorganization on different terms, which were reported as being formed by stockholders who objected to the plan formulated by the Central Trust Co.

Southern Pacific.—The land sales for the year made by the land department of the Central Pacific Railroad Co. amounted to about $304,000, and for the same time the department of Southern Pacific Railroad Co. reports sales of lands amounting to about $380,000.

Western New York & Pennsylvania.—The annual meeting which was called to meet in Philadelphia, Monday, Jan. 11, adjourned to Tuesday and Wednesday without electing officers. The contest was over the representation in the Board of Directors of the Philadelphia stockholders, who are said to own 105,000 shares of the capital stock. Vice-President S. G. De Coursey, of Philadelphia, claims that these holdings ought to have a greater representation than three of the 12 Directors composing the Board. The present management holds proxies from the Amsterdam and New York stockholders, but the legality of the former proxies has been questioned by the Philadelphia committee. So far an election has been prevented.

The annual report gives the following figures: Gross earnings: $3,562,668; decrease, $78,388; operating expenses, $2,485,782; decrease, $156,808; net earnings, $998,466; decrease, $78,420; income from other sources, $4,074; total, $1,080,960; taxes, interest on real estate and equipment, $127,274; interest on first mortgage bonds, $503,500; balance, $448,185.

Wheeling Bridge & Terminal Co.—The dispatches sent out from Wheeling, W. Va., to the effect that negotiations had been pending between the Baltimore & Ohio and the Wheeling & Lake Erie with the Wheeling Bridge & Terminal Co. whereby the two former were to gain control of the bridges and lines of the latter, are said by the managers of the Bridge & Terminal Co. to be without foundation.

TRAFFIC.

Traffic Notes.

Washington dispatches announce that a new fast mail train from New York to the Southwest is to be put on about Jan. 20. It will run over the Pennsylvania, leaving New York at 9:15 a. m. and arriving at Indianapolis at 7:55 the next morning. Mails will arrive in St. Louis at 5 o'clock p. m.

The Northern Pacific is selling 3,000 mile tickets for $75. These tickets are good on the main line and branches of the Northern Pacific in Idaho, Washington and Oregon. They will also be accepted by the Oregon & Washington, the Seattle, Lake Shore & Eastern and on Northern Pacific trains on the Seattle & Northern. This rate is a large reduction from local fares.

The special freight train carrying 12 carloads of carpet ran from Algiers, opposite New Orleans, to San Francisco over the Southern Pacific in 4 days and 5 hours, making the time from New York to San Francisco 11 days, 2 hours, 55 minutes. The freight was carried from New York to New Orleans by steamer. The distance from Algiers to San Francisco is 2,496 miles and the rate of speed, including stops, was nearly 20 miles an hour.

President Calloway, in an interview at Toledo regarding the withdrawal of the Toledo, St. Louis & Kansas City from the joint committee, said: "This company has never been a member of the Central Traffic Association further than paying a portion of the expenses and agreeing to abide by the tariffs and rates made in joint conference. Some months ago, at the request of the association, the Toledo, St. Louis & Kansas City agreed to accept differential rates in lieu of commissions, but when the award was made it was allowed only via the Nickel Plate and other lines that had practically no through train service; and being unsatisfactory to this company we gave the requisite notice of withdrawal from the agreement." Some of the Chicago prophets think that the Wabash will follow the Toledo, St. Louis & Kansas City in withdrawing from the joint committee and that then the Chicago & Grand Trunk will be forced to take similar action. They say that for some time the Wabash has been exceedingly restive in the Central Traffic Association councils, and that little provocation would be required to cause its speedy retirement.

Transcontinential Differentials via the Canadian Pacific.

The differential freight rates to San Francisco over the Great Northern and Canadian Pacific, which were abolished about a year ago, have been re established, and went into effect Jan. 4. The differentials allowed from St. Paul and Minneapolis to San Francisco are as follows:

First-class, 15 cents per 100 lbs.; second, 12 cents; third, fourth and fifth, 10 cents; Classes A and B, 8 cents; Class C, 7 cents; Classes D and E, 5 cents.

These differentials apply only to freight destined for San Francisco. It appears that on the expiration of the agreement the Canadian Pacific reduced the rates without any ado.

Western Traffic Association.

A regular meeting of the Advisory Board of this association was held in New York City on Monday and Tuesday of this week, all the important roads being represented. Roswell Miller was re elected President, and the five Commissioners were re-elected, as follows: Aldace F. Walker, Chairman; James W. Midgley, J. N. Faithorn, W. W. Finley and James Smith. Chairman Walker's three-year contract, at $25,000 a year, is about to expire, and the reporters are speculating as to whether he will hereafter have to put up with the regular salary of his present position, which is $12,500 a year. The Missouri Pacific presented charges of rate cutting against the Atchison, Topeka & Santa Fe, the Chicago, Burlington & Quincy and the Southern Pacific, but they went over under the rule giving the accused a reasonable time in which to prepare a defense. The meeting considered various appeals from the Commissioners' decisions, but the action on these is not yet given out.

Kansas Commissioners' Decision on Sugar Rates.

The old question of discrimination against interior Kansas cities in freight rates on sugar from California has again been the subject of an elaborate report, this time by the State Railroad Commissioners of Kansas before whom it has been brought in the shape of a complaint that the rates from Atchison to Wichita, Hutchinson and other cities are exorbitant. It will be remembered that the Interstate Commerce Commission decided a complaint of this kind in May, 1890, holding that, as the competition from San Francisco to Kansas City, Mo., and other Missouri River points was uncontrollable and outside the provisions of the Interstate Commerce law, the charging of a lower rate to Kansas City than to interior Kansas points was justifiable. The same question has lately come before the Interstate Commerce Commission in a little different shape and the decision upon it was reported in the *Railroad Gazette* of Dec. 25 last, though the question in this case was upon rates from New Orleans via the Atchison, Topeka & Santa Fe.

The Kansas Commissioners' decision is a spirited document abounding in sharp passages, and goes into the question in a good deal of detail, but no new point of law or equity is brought out, and the decision states that the order of the board reducing rates within the state of Kansas, which it has been decided to issue, will be held in abeyance until Feb. 1, in the hope that the roads will reduce interstate rates and thus obviate the necessity of action by the board. The commissioners recognize the "vexatious environments" of the question, and the commercial power of Kansas City, and therefore suggest a rate of 75 cents on sugar from San Francisco to the interior points which have complained, the present rates being 65 cents to Kansas City and $1.01 to the interior points. The basis on which the commissioners urge this action is that the owner of property has an undoubted right to stop it at any point short of destination on payment of full charges to destination. The decision claims that there is no actual water competition between San Francisco and Missouri River points and that but a single shipment of sugar has ever been made by water to Kansas City.

The same decision takes up the complaint of jobbers regarding rates on other groceries from interior jobbing centres to points which they regard as tributary to themselves, but which are more than 75 miles eastward. Rates to points within 75 miles were reduced by the decision of the commissioners in the Wichita case in March, 1889. It appears, among other things, that the Wichita people got sick of the advantages afforded them by the commissioners in 1889, and have since asked that the tariff established by the board for them be abrogated. The commissioners, in their constant aim to "get even" with the enemies of the state, to wit, the merchants of Kansas City, Mo., now decide to reduce rates for the interior jobbers, but instead of changing the local rates for distributing small shipments from the jobbing centres, they order the reduction of fifth class rates, which cover heavy shipments from Atchison to the jobbing centres, to the following figures: To Wichita 29 cents; to Arkansas City, 33 cents, and to Salina, 25 cents.

Eastbound Shipments—Largest Tonnage on Record.

The shipments of eastbound freight, not including live stock, from Chicago by all the lines for the week ending Jan. 9 amounted to 144,545 tons, against 134,676 tons during the preceding week, an increase of 9,869 tons, and against 92,597 tons during the corresponding week of 1891, an increase of 51,948 tons. The proportions carried by each road were:

Roads.	Wk. to Jan. 7. Tons.	P. c.	Wk. to Jan. 2. Tons.	P. c.
Michigan Central	21,583	15.0	17,710	13.3
Wabash	7,239	5.0	6,715	5.1
Lake Shore & Michigan South.	31,231	21.6	26,824	20.0
Pitts., Ft. Wayne & Chicago	18,688	12.9	22 360	16.7
Pitts., Cin., Chicago & St. L	13,342	9.3	11,035	8.3
Baltimore & Ohio	10,665	7.3	9,301	7.1
Chicago & Grand Trunk	17,671	12 2	15,895	11 2
New York, Chic. & St. Louis	11,439	7.9	12,557	9.1
Chicago & Erie	12,696	8.8	12,279	9.2
Total	144,515	100.0	134,676	100.9

Of the above shipments 22,250 tons were flour, 83,862 tons grain, 5,887 tons millstuffs, 5,550 tons cured meats, 10,333 tons dressed beef, 1,425 tons hides and 2,673 tons lumber. These shipments are the heaviest for any one week in the history of Chicago. The three Vanderbilt lines carried 44.5 per cent. of all the business, and the two Pennsylvania lines 22.2 per cent.

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